THE IRON AGE

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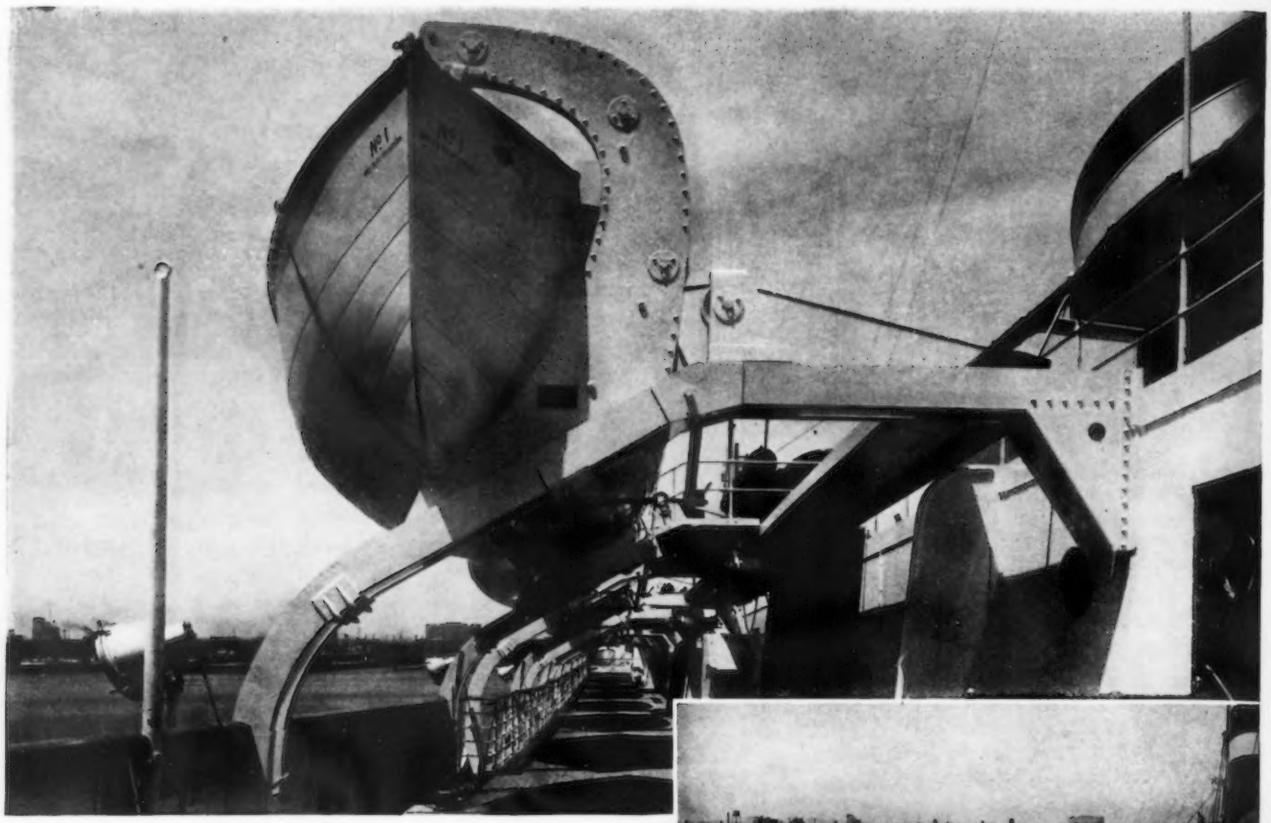


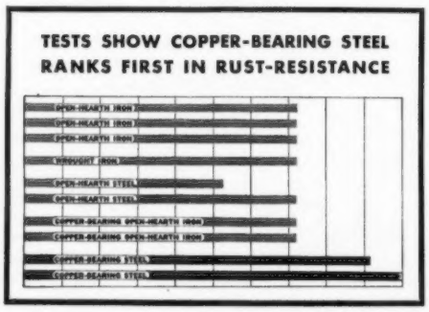
These modern metal life-boats on the S.S. Manhattan of the United States Lines are made of 14-gauge Beth-Cu-Loy Sheets. Beth-Cu-Loy was selected for this application by the Welin Davit and Boat Corporation, builders of the boats, because the constant exposure of the boats to salt air calls for a sheet of high durability.

The Common-Sense Sheet for exposure to Rust

WHEN any product manufactured from sheets is likely to be exposed to moisture, it is only common sense to make it of Beth-Cu-Loy Galvanized Sheets. While their copper-bearing steel composition gives Beth-Cu-Loy Sheets the ability to defy rust, their cost is not appreciably greater than that of ordinary sheets.

And it's equally logical to use sheets of Beth-Cu-Loy for those really strenuous applications in which a sheet of outstanding powers of rust-resistance is plainly called for.

For, although Beth-Cu-Loy is inexpensive, its copper-bearing steel composition makes it superior in rust-resistance to other iron or steel sheets of commercial quality, regardless of their cost. Tests carried out by the American Society for Testing Materials have shown that sheets of copper-bearing steel outlast sheets of ordinary iron or steel by from two to two and one-half times, and that no iron or steel of commercial quality, regardless of its cost, equals copper-bearing steel in ability to resist atmospheric corrosion.



This chart, summarizing the results of tests carried out by the American Society for Testing Materials, at Key West, Florida, shows that under exposure to sea air sheets of copper-bearing steel (Beth-Cu-Loy composition) decidedly outlast sheets of ordinary iron and steel. In other tests, at different locations, copper-bearing steel made an equally favorable showing.

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... THE IRON AGE ...

FEBRUARY 14, 1935

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The Little Chap With the Big Voice

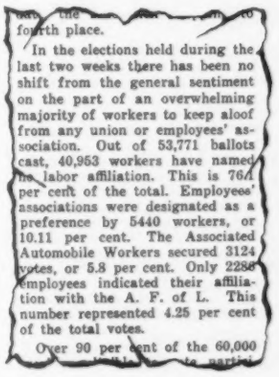
CENTURIES ago, the inhabitants of a central European village were kept in subjection in a rather peculiar fashion. The village was situated in a valley surrounded by mountains. Every so often a thunderous and terrifying voice would make itself heard from beyond the mountains, issuing commands which would be instantly obeyed by the inhabitants and even by the rulers of the community.

No one, of course, had the temerity to climb to the mountain tops to see this terrible giant, who kept himself well concealed. They knew that he must be the largest and most powerful giant in creation, for he let no occasion pass by without telling them so.

When the rulers of the village passed a law or made an appointment to office which the giant did not like, he would threaten them with dire consequences unless they obeyed his commands. One of his favorite threats was that he would shut off their incoming and outgoing traffic with other parts of the country and thus starve them into submission if they did not do as he directed. Also, he exacted a money tribute from the villagers which had to be put in a certain secluded spot in the dark of each moon, and for which, of course, he rendered no accounting.

This sort of thing went on for many years, the thunderous voice becoming deeper and more terrifying and the demands getting greater and greater. Finally, there came to the village a fearless young man whose motto was: "Seeing is Believing." He refused to take the giant at voice value, or to pay tribute and submit to his demands without first having the opportunity to "size up" this dictator. Disguising himself as a tree with branches and leaves, he climbed the mountain and found that the imagined giant was just an ordinary little chap with a voice about 20 times as big as it should have been to fit his stature.

From that time on the villagers paid little heed to the big voice, and the mountains surrounding the village were known as bluffs.



fourth place.

In the elections held during the last two weeks there has been no shift from the general sentiment on the part of an overwhelming majority of workers to keep aloof from any union or employees' association. Out of 53,771 ballots cast, 40,953 workers have named no labor affiliation. This is 76.1 per cent of the total. Employees' associations were designated as a preference by 5440 workers, or 10.11 per cent. The Associated Automobile Workers secured 3124 votes, or 5.8 per cent. Only 2286 employees indicated their affiliation with the A. F. of L. This number represented 4.25 per cent of the total votes.

Over 90 per cent of the 60,000

The Iron Age, Feb. 7, 1935

J. W. VanDeventer

Metallic Insulators Are Effective

o o o

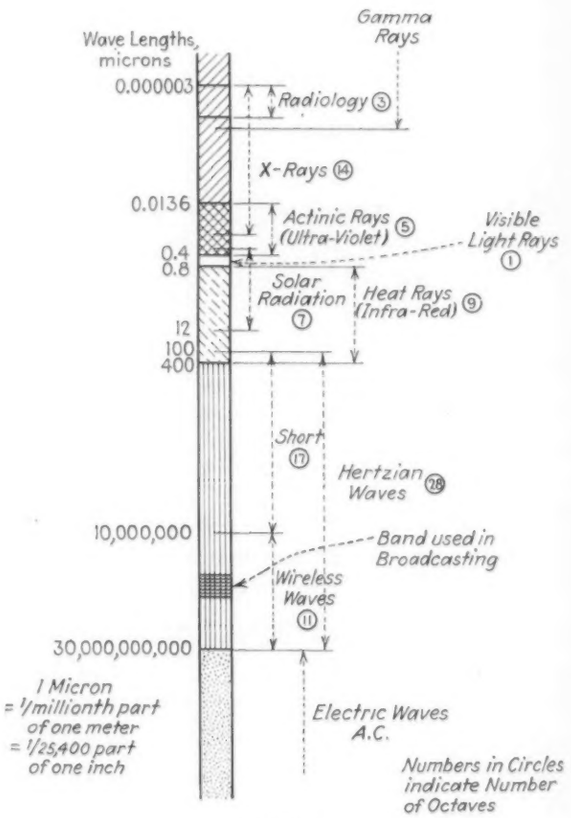
ALL practical heat manifestations such as production, absorption, utilization, conservation and insulation are better understood today because of the general acceptance of the new theories of vibration-energy. The electro-magnetic waves furnish the most lucid explanation for all thermic phenomena and lift the veil of mystery from many puzzling problems.

According to these conceptions heat is only one of the varied physical forms of radiation. In Fig. 1 the sequence of the numerous modes of radiation-energy are shown on a somewhat distorted scale. The increasing values of the wave lengths of the vibrations are used as a basis for comparison. The drawing is only a simplified diagram such as might appear in an encyclopedia to give an airplane view of the whole subject.

The outstanding impression from this graph is the coordination and unification of various independent scientific fields within one framework. Even a casual glance tells the observer that wireless waves are second cousins to heat rays and that the luminous rays and X-rays are even more closely related. Nothing has contributed more to the general acceptance of these theories and their diffusion among all people than the extraordinary popularity of radio during the past decade. The transformation of the waves within the broadcasting band into audible waves of the air was most convincing even to the man in the street. The noise did it if nothing else.

All these radiating vibrations, be they called wireless, Hertzian, thermic, luminous, or actinic, are identical in their nature; they differ in their forms—frequency—wave length—character. They all propagate at the same speed, always constant, of 300,000 kilometers per second. Rays are merely trajectories of the movement of the radiating energy; their intensities are measured by the amplitude of the waves just as the violence of the storm is indicated by the height of the sea waves.

Heat is one physical form of the action of a certain group of rays on various substances; this group is usually called the infra-red zone because it is contiguous to the luminous rays on the red side of the spectrum. The heat rays comprise a wide zone of nine octaves varying from below 1 to 400 microns in wave length. The luminous or light rays, visible to the eye, form a narrow band of only one octave having a wave length of 0.4 to 0.75 microns. They are followed by the shorter ultra-violet rays, the X-rays, the still shorter alpha, beta and gamma



ABOVE

FIG. 1—Sequence of electromagnetic waves, modes of radiation energy.

AT RIGHT

FIG. 2—Variation of intensity of radiation and wave lengths of vibrations with temperatures.

*Copyright 1935 by J. F. Shadgen.

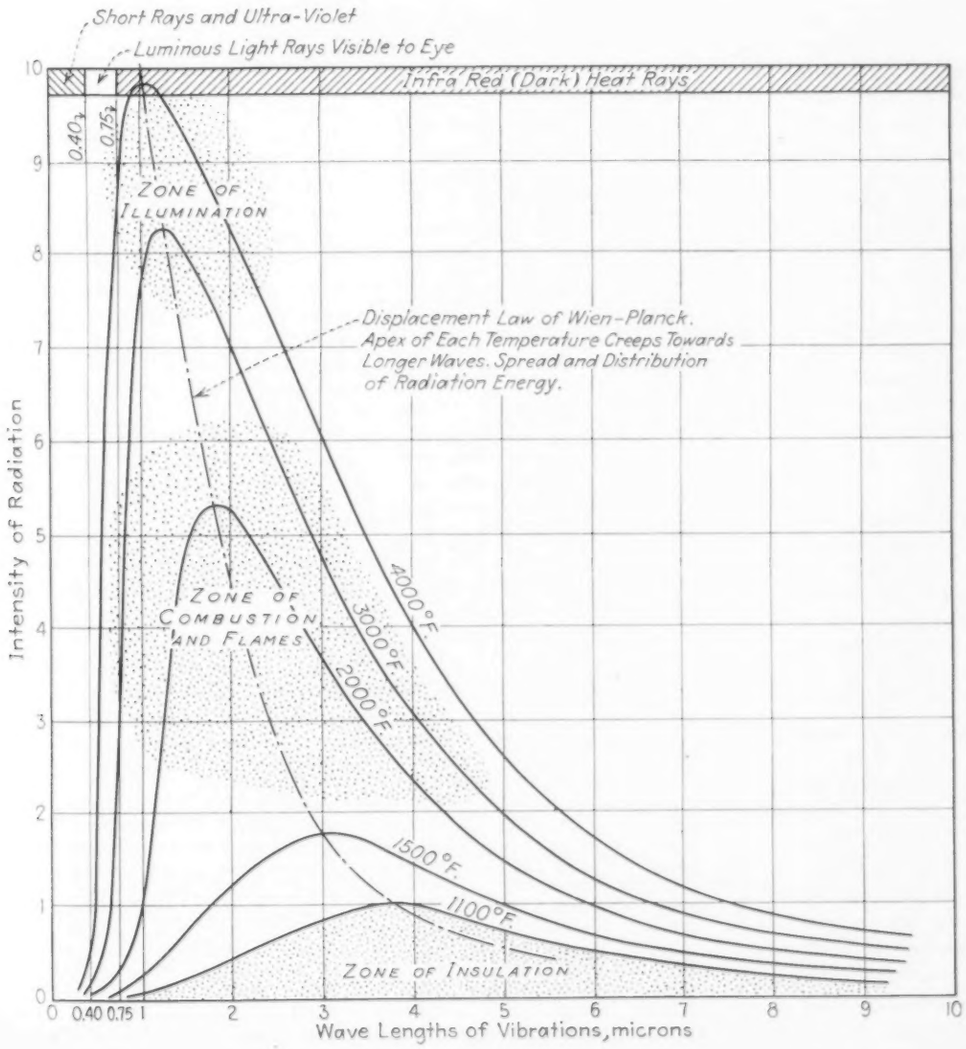
Heat-Ray Traps*

By JOSEPH F. SHADGEN
Ing. A.M.M., New York

Additional Technical Information on Insulation for Heat and Cold Using Low-Emissivity Steel Surfaces with Large Air Spaces

rays. The solar emanations comprise seven octaves and straddle three of these zones—the ultra-violet, the light and the heat zones. Each of these various groups of rays or waves was, until lately, considered an independent branch of physics and each had a terminology of its own, but today they fuse into each other and often overlap, causing better understanding.

The kinetic concept of heat considers the temperature of a body to be the expression of the potential of the molecular agitation. An increased temperature, meaning a more active movement among the molecules of a substance, causes a more intense flow of radiation energy. It is not only interesting but most useful to find out how temperatures affect the intensity of the wave lengths within the zone of heat and light rays. The Nobel prize physicist, W. Wien, was the first to investigate this problem as far back as 1893, when he published his first reports in the *Annalen der Physik und Chemie* of Leipsic. Not only did he experimentally check up the basic law established by the physicists, Stefan (1879) and Boltzmann (1884), but he found out the relation between intensity of radi-


Short Rays and Ultra-Violet
Luminous Light Rays Visible to Eye
Infra Red (Dark) Heat Rays
0.40μ
0.75μ
ZONE OF ILLUMINATION
Displacement Law of Wien-Planck. Apex of Each Temperature Creeps Towards Longer Waves. Spread and Distribution of Radiation Energy.
ZONE OF COMBUSTION AND FLAMES
4000°F.
3000°F.
2000°F.
1500°F.
1100°F.
ZONE OF INSULATION
Intensity of Radiation
Wave Lengths of Vibrations, microns
0 0.40 0.75 1 2 3 4 5 6 7 8 9 10

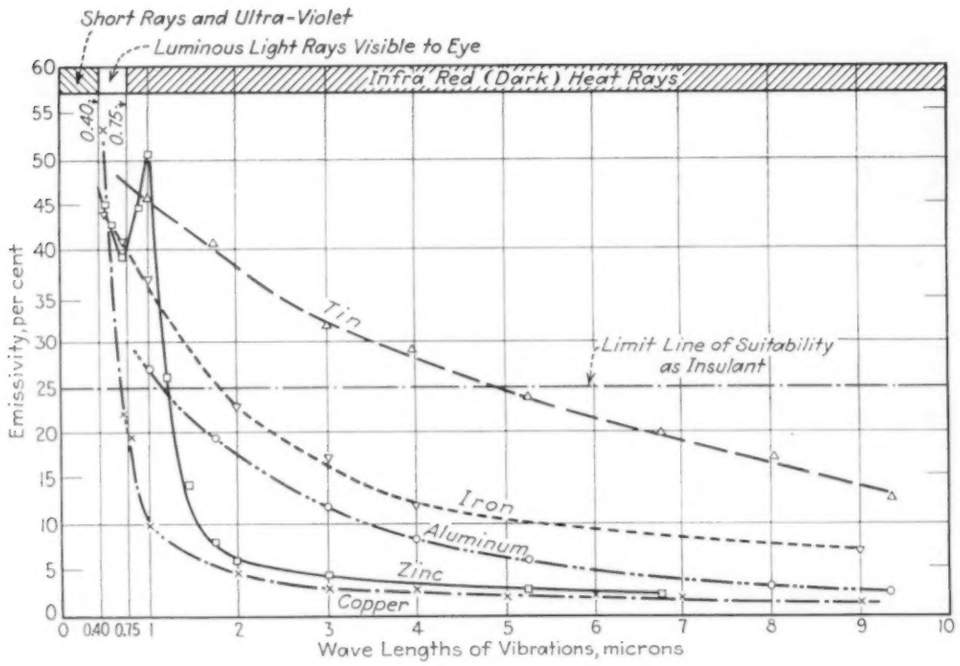


FIG. 3—Changes in emissivity values with wave lengths of various metallic surfaces.

ation at various temperatures and the wave lengths of the emanations. This is expressed by what is now called the Wien-Planck displacement law postulating that the maximum intensity of each temperature differs with the wave length. Fig. 2 shows in diagrammatic form the distribution curves of a few temperatures and the creep of the apex of their maxima. These conclusions were reached some 40 years ago. They have been confirmed by other investigators, but their significance was never grasped outside of laboratory walls. Industry, with its practical point of view, ignored their implications.

For the sake of simplicity the absolute temperature scale has not been given in Fig. 2, although from a scientific point of view it should be used, as it furnishes a true measure of the potential of the energy in the molecules of each substance.

A study of the relationship shown in Fig. 2 leads to a remarkable and simple interpretation. At the bottom there is the zone of insulation, ranging from −50 deg. F. to + 1000-1200 deg. F.; in the center is the zone of combustion, and at the top the zone of illumination. These three fields, of unquestioned industrial importance, are juxtaposed in this picture with the microns of the radiant waves as a comparative yardstick.

Application to Lighting

It must be frankly admitted that only the laboratories dealing with light problems, in particular the Mazda research group, took advantage of Dr. Wien's fundamental deductions by incorporating them in their designs. The illuminating engineers aim at the production of the highest possible temperatures to increase the generation of the rays in the luminous zone (0.4 to 0.7 microns). Here is the reason for the development of the carbon filament (3400 deg. F.), the tungsten wire (4200 deg. F.), the gas-filled bulbs (4600 deg. F.), and the arc (6000 deg F.), and the incessant search for bulb designs good for 5000-6000 deg F.

The jump from carbon filament to the tungsten wire increased the proportion of the emanations of the light rays from over 10 per cent to 18 per cent. Lately some 25 to 30 per cent of the energy input has been transformed into light; the balance is still going to waste in the form of the longer heat waves. The arc lamps owe their efficiency as light sources to their high crater temperatures between their carbons.

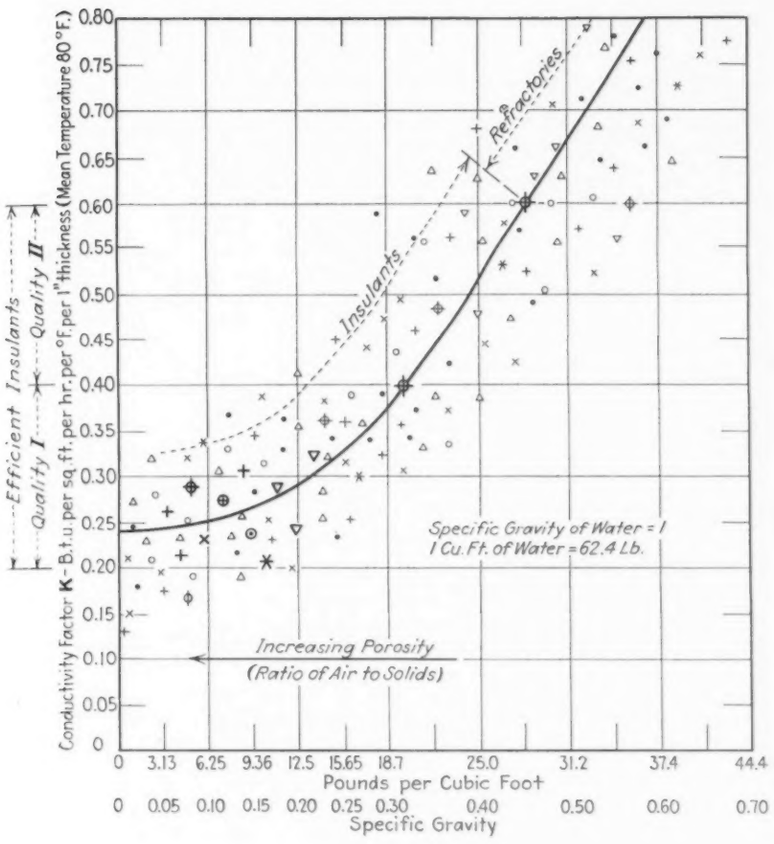
The combustion engineers have suffered greatly from a flame-luminous ray complex, namely, because they ignored the Wien-Planck law. Volumes have been written on the value of luminous versus non-luminous flames. Yet, as Fig. 2 shows, combustion or flame temperatures (normal range from 2500 to 3500 deg. F.) radiate only 10 to 15 per cent of the chemical energy contained in the fuels in form of visible waves, while 85-90 per cent, the bulk, will be transformed into black rays in the order of 1 to 10 microns or more. This knocks the props from under a widely circulated discussion.

The insulation specialists have given the radiation effect due consideration only in the past five or six years or so, after neglecting it altogether. Because we did not see the dark rays we failed to consider their effect; yet we felt their

FIG. No. 4

COMPARATIVE PROPERTIES OF VARIOUS METALS

		Specific Gravity		Thermal Conductivity		Melting	Specific Heat Factor		Elongation, Inch Per Inch	
Nos.	Material	D	Ratio, Per Cent	"K"	Ratio, Per Cent	Points, Deg. F.	B.t.u. per Lb. Per Deg. F.	Ratio, Per Cent	Per 100 Deg. F.	Ratio, Per Cent
1	Iron	7.70	100	450	100	2,786	0.161	100	0.00065	100
2	Steel	7.85	102	320	75	2,700	0.160	99.5	0.00061	94
3	Aluminum	2.70	31	1,410	312	1,218	0.249	155	0.00127	210
4	Zinc	7.20	93.5	770	170	786	0.100	62.3	0.00160	250
5	Copper	8.90	115	2,600	580	1,981	0.102	63.5	0.00092	140
6	Lead	11.40	148	240	54	621	0.030	18.5	0.00160	250
7	Tin	7.50	97.5	430	96	450	0.060	37	0.00127	210
8	Nickel	8.80	114	410	91	2,646	0.129	80	0.00055	85
×	Water	1.00	13	4.3	1.0	32	1.000	623.0	0.01220	1.990


Efficient Insulants
Quality I
Quality II
Conductivity Factor K - B.t.u. per sq. ft. per hr. per °F. per 1" thickness (Mean Temperature 80 °F.)
Refractories
Insulants
Specific Gravity of Water = 1
1 Cu. Ft. of Water = 62.4 Lb.
Increasing Porosity
(Ratio of Air to Solids)
Pounds per Cubic Foot
Specific Gravity

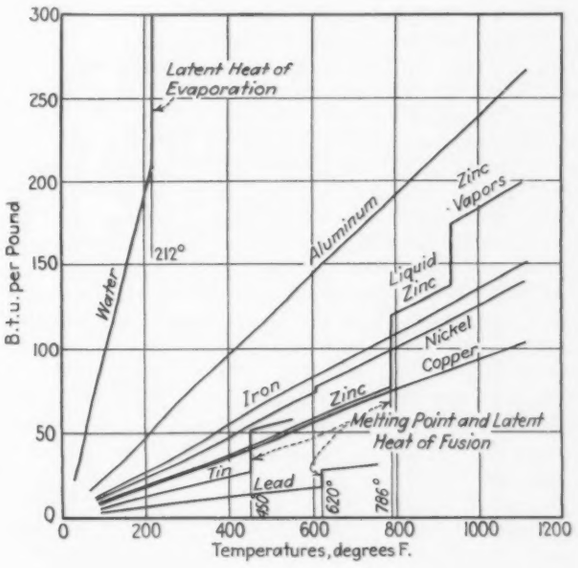
ABOVE

FIG. 6—Trend line of average showing heat conductivity factors of mass type insulants versus densities.

o o o

AT RIGHT

FIG. 5—Heat content curves of various metals.



influence all the time in the sun, as well as in all heat applications. This is all the more surprising because the zone of low-temperature emanation covers, beside insulation, other industrial applications of great magnitude.

Need of Research

The literature is bare of basic data. Here is a hole in our scientific fabric that needs mending right away. Responsible research organizations, in particular the Bureau of Standards, or leading universities should fill the gap by concerted research and authoritative exploration. The scope of this investigation should include the study of reflection as well as refraction, concentration as well as diffusion, selective filtration as well as interference and polarization of the infra-red rays over their full range. Modern instruments and measuring devices are so highly developed that positive results are assured. The timeliness of this suggestion is obvious.

Insulation's Main Problem is Radiation

To illustrate the dominating part the radiation of heat plays at very low temperatures, the example of the human body furnishes an unusually effective case study. Every person is an ambulant heat generating unit, at 98 to 99 deg. F., that radiates 45 per cent of the heat of the delicately controlled thermostat of the body. Only 30 per cent is lost by convection-conduction; the remainder (30 per cent), through the evaporation effect. Yet we do not know the wave lengths and the distribution of the intensities in that temperature zone.

It is idle to repeat that radiation is the major issue in all problems of heat conservation and elimination of waste. Insulation has the definite purpose of trapping the heat rays, of stopping or opposing the transfer of the heat energy. Effective heat ray traps (to use the vernacular of the radio fans—wave traps) can be made by using properly selected surfaces of low emissivity—high reflectivity separated by air spaces as was shown in a previous study (see THE IRON AGE, Jan. 17, 1935). To these fundamental considerations the following basic data will be welcome additions.

Emissivity-Reflectivity Values and Wave Length

In Fig. 3 the emissivity values of important metals have been plotted against the lengths of the various vibrations in the zone between 0.5-10 microns; the various coefficients are taken from the International Tables. In spite of the acknowledged authority of this source it is suspected that these figures are of old vintage. No accurate dates or sources are given; no information regarding the nature of the metallic surfaces is specifically mentioned. Of great interest is the kink in the zinc curve between 0.5 and 1 microns. The trend lines of four metals show considerable similitude. Tin shows consistent high emissivity values

that will restrict its possible use in the insulation field. Fig. 3 is a companion to Fig. 2; the abscissae are identical and are drawn to the same scale.

At least four metals have a chance to be adapted to designs reflecting the heat rays effectively back to their source or redirecting their trajectories so as to minimize the heat transfer. In order to evaluate the competitive positions of these four metals several vital characteristics have been collected in the tabulation Fig. 4. Besides the specific gravities and the melting points, it is necessary to compare the thermal conductivity, the specific heat and the elongation factor of the various metals.

Lead, tin and nickel eliminate themselves from consideration. Nickel, although closely related to iron, is hopelessly handicapped by an unusually high base price 40c. to 50c. per lb. Tin, besides having the high emissivity value mentioned above, is high priced and has poor mechanical properties for this purpose. Lead is too heavy and too weak mechanically; it has a chance only as a covering in association with other metals, for instance, iron. Of the four leading contestants two are actually in use —aluminum and steel; the others, zinc and copper, have only potential values at present. This table furnishes any engineer with enough information to permit him to formulate his own judgment. Iron and steel sheets cut a pretty good figure from this angle; the advantageous position of this base metal can be increased further by judicious design features.

For practical purposes the product of specific heat multiplied by temperature is important. It gives the heat content in B.t.u.'s per pound of the metal. Fig. 5 illustrates graphically the heat content curves of the substances under consideration. These figures are taken from a study published by the author in THE IRON AGE in 1922, based on Dr. Wuest's laboratory investigation. More reliable figures have not been released during the past decade.

Contributing Value of Air Spaces

All insulating materials of whatever nature or design use the low heat conductivity of still air as a valuable component factor.

An effort to appraise the relative value of the air led to the making of Fig. 6 by plotting the conductivity factors "K" of some (about one hundred) samples of mass-type insulators against their specific gravities. This shows an average trend line that clearly demonstrates the porosity effect as well as its limitations. The curve of averages flattens out in its lower-left hand end, meaning that for very light materials, the influence of the air loses its importance. Good insulators weigh less than 25 lb. per cu. ft. The most efficient and most popular of this type weigh between 10 and 20 lb. and average 60 to 70 per cent air-volume ratio. Some designs are very light but then they are without mechanical strength and must be supported to make real serviceable units.

The nature of the application decides if these supports are to be charged against the insulation or not. Mattresses, blankets, quilts and covers are the most popular of the very light-weight type. Bricks, plastics and powders are the heavier types which are denser and also stronger.

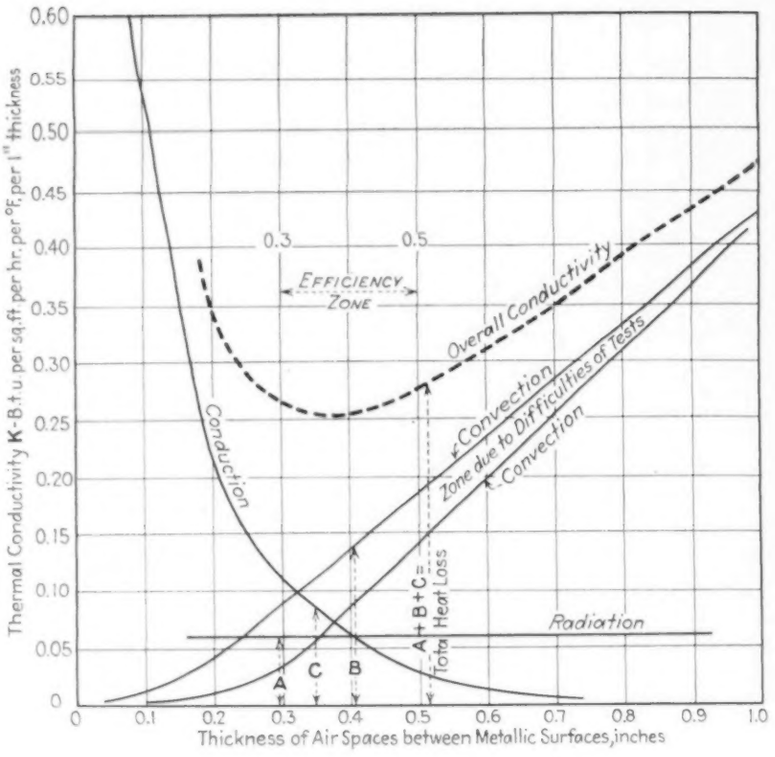


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FIG. 7—Variations of the total heat conductivity and the three component factors with thickness of air space.

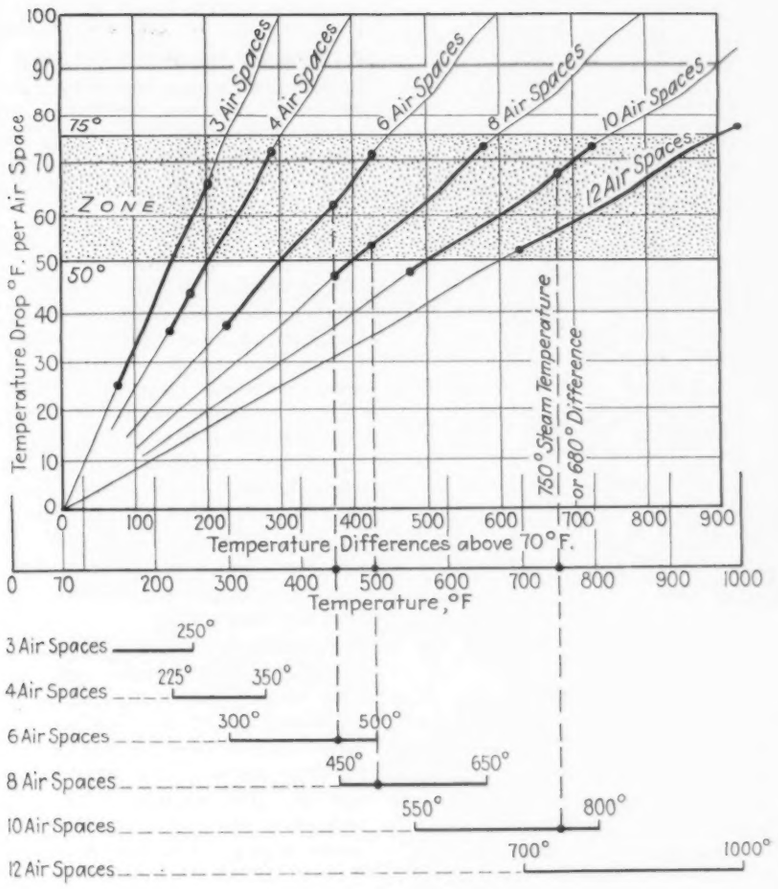
AT RIGHT

FIG. 8—Graph showing number of air spaces for various temperatures of massless insulants.

Metal Insulators Use Large Air Spaces

Not only does the massless type of insulator use metallic walls, but fairly large air spaces are an inherent characteristic. The first paradox has been explained by the low emissivity values of the wall surfaces. It is necessary to show cause for the use of the second radical feature. For 30 years the engineering trend was in the opposite direction, toward smaller, even microscopic dead air cells.

Thorough laboratory investigations have proved conclusively that fairly large air cells are very efficient insulators under certain conditions. First, positive separation into cells or chambers is necessary to avoid channels and cross-connections; these, of course, lead to the production of chimney-effects, the formation of hot spots and result in poor efficiencies. The second factor is that the dimensions of



the air spaces should be small in the direction of heat flow. That means parallel walls located close together. How close?

Thickness of Air Spaces

This particular feature has been explored very thoroughly both in Europe and in the United States. The thickness of air space between reflecting surfaces that most investigators found to give the best results varies between ⅜ and ½ in. This has also been confirmed by theoretical calculations. It stands to reason that a 1-in. gap allows too easy convection and that a 1/16-in. gap permits too much conduction; so the compromise between these two contributing elements results in the selection of a zone of compromise. Fig. 7 graphically shows an analysis of the relationship of these three heat loss causes and the thickness of air space. The radiation effect is constant; hence a fixed value. The conduction is expressed by a downsloping curve that flares down in asymptotic fashion where the air layer exceeds some 0.3 to 0.5 in. in thickness; the convection loss has a rising curve characteristic.

The summation of these three factors gives a composite curve with a valley between 0.3 in. and 0.5 in., meaning that there is a zone of high effectiveness and an optimum point around 0.38 in. equivalent to 1 centimeter.

The other dimensions perpendicular to the direction of the heat transfer have also been explored by experimental research. It has been found, provided the thickness is between ½ in. and ⅜ in. and provided the cells are fairly air tight, that dimensions up to 12 in. or 16 in. give very satisfactory results. It will be up to the ingenuity of each specific design to take advantage of these general guiding features to produce the most practical overall value for the user.

In Fig. 8 a graphical solution is presented to determine quickly the number of air spaces for the current range of heat applications. The abscissae are the temperature differences above 70 deg. F. with an additional line for the real temperatures. The ordinates are the pressure drops per air space varying from 10 to 100 deg. F. with a desired zone between 45 deg. and 70 deg. The radiants give the number of air spaces and the temperature range for each standard construction.

Influence of Water

Every manufacturer and user of insulating material faces one outside factor that complicates the heat transfer problem considerably. That is water—the moisture in the ingredients as well as the humidity in the air.

Water is a very troublesome interference. Moisture is the reason for tight coverings on all designs, which may take the form of plaster, canvas, steel sheetings, etc., and which are very expensive and increase the installed cost materially. Moisture is also the reason for all kinds of impregnations and all types of anti-toxins, to use a medical paraphrase, of the insulating ingredients.

In Fig. 9 the two reasons for the bugaboo influence of water are graphically illustrated. The cause of it all is that water changes its physical form within the narrow temperature range of 180 deg. from 32 deg. to 212 deg. F., and that vapors exist all the time at ordinary temperatures. The jumping into the liquid phase and back into the vapor phase, due to the climatic fluctuations, is, of course, inevitable, but it is a nuisance in all insulating problems.

The specfic heat conductivity curves of the solid, liquid and gaseous forms of water are plotted and show the enormous jumps from 0.2 to 4.0 and from 4.0 to 16 in the values of "K," expressing B.t.u. per square foot, per hour, per degree F., per 1 in. thickness; 2000 per cent and 400 per cent respectively.

The other determining factor is the sudden changes in the specific gravity and the variations due to each elongation factor. Ice is much lighter than water, about 10 per cent. Consequently freezing water will exert enormous pressure, destroying many designs and materials as well with a practically irresistible force if opposed. The combination of these two curves on one chart gives at a glance the answer to the importance of water in an insulation problem facing every practical engineer.

The massless-type insulators are more immune to the effects of water than any other type. First. the materials entering the designs

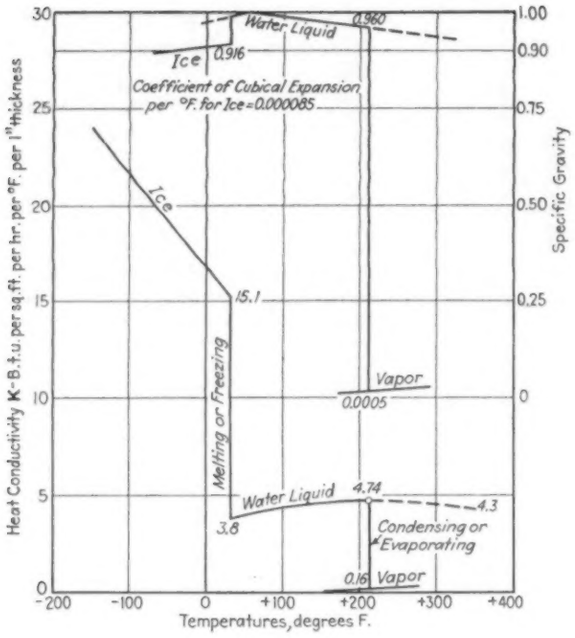


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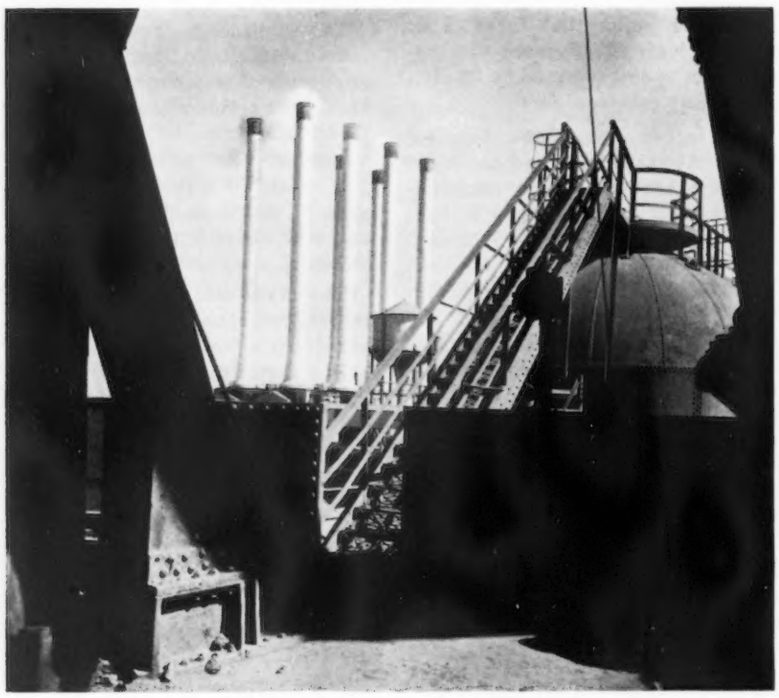
FIG. 9—Heat conductivity factors and densities of water—solid, liquid and vapor.

are not hygroscopic; second, the air spaces are large and give the tiny amount of air moisture plenty of elbow room. In all heat applications above +70 deg. F. the water problem is nominal if an airtight design is developed. In cold applications, below +70 deg. F., the question of corrosion may appear in addition. This can easily be overcome by proper skin treatment of the metallic surfaces. Iron or steel sheets, for instance, can be covered with lead coats, and lacquers can be used to protect aluminum exposed to sea air. These problems are not serious, the metallurgist and chemist have developed so many solutions that the designers may be embarrassed in the matter of choice.

Conclusions

In this dissertation additional information of value to manufacturers, fabricators and users of insulating materials are given to put engineers in a position to appraise intelligently the specific designs of massless-type insulators. In these days of economic readjustment and changing conditions the tendency toward greater efficiencies will demand better products. Iron and steel sheets stand a very good chance to prove their usefulness in this new industrial field by furnishing a sound basis for effective heat ray traps.

The underlying principles of this development are sound and the near future will bring forth a number of practical designs and detailed constructions of real merit. Progress demands constant change and the alert engineer will avail himself of the opportunities of the latest scientific achievements.



VIEWED from the top of the blast furnaces at the River Rouge plant of the Ford Motor Co. at Dearborn, Mich., the huge stacks of the powerhouse seem to pierce the sky. Beneath them a giant labors tirelessly —turbo-generators that can deliver 330,000 hp driving an endless variety of machines and conveyors throughout the 1100-acre plant. The stacks mark the very heart of the tremendous industrial engine, now undergoing a $20,000,000 expansion and improvement, in preparation for Henry Ford's drive to "build better than 1,000,000 Ford cars in 1935."

The Case for and Against the Shorter Work Week

By M. H. REYMOND

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THERE was a time when it was considered reasonable and proper in industrial practice that human beings should work 12 hours per day and 72 hours per week. In time, it became customary to work 10 hours per day and 60 hours per week. During the last generation, industry gradually shifted over to an 8-hour day and a 48-hour week.

Thanks to the development of labor-saving machinery and methods (at times mistakenly opposed by labor and by certain confused economic theorists), this reduction in hours has been accomplished without lowering the standard of living of labor. On the contrary, this reduction has been accompanied by a substantial improvement in standard of living.

It would be rash to attempt to predict how rapidly this broad sociological trend toward less hours of labor will proceed. It is certainly not unreasonable to look forward to a 6-hour day and a 30-hour week, combined with sufficient further increase in productive and distributive efficiency to insure an even higher standard of living than has yet been enjoyed by labor.

The present controversy, revolving around reducing hours in the direction of a 30-hour week, is not of this ultimate nature. It involves rather the question: Is it of advantage to the country as a whole and to labor in particular to try to force upon industry during a period of depression fewer hours per week combined with higher wages per hour?

INDUSTRY is on trial on the charge of operating its workers too many hours per week for the public good. This, in effect, is what is meant by the introduction of the 30-hour week bill in Congress.

It is well to hear the arguments both pro and con in this matter, and they are stated in the accompanying article. From the evidence that the author presents, it would seem that the defendant is not guilty.

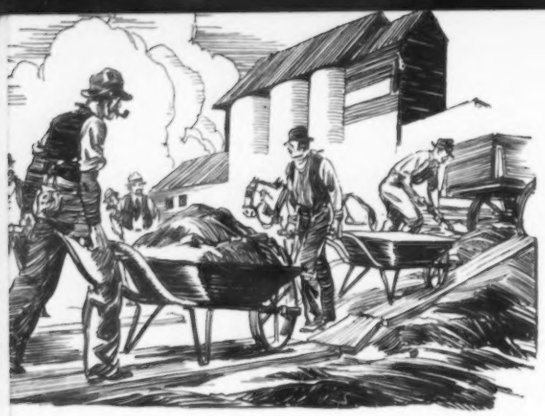
The Case for the Affirmative

The people who believe in an affirmative answer to this question appear to be influenced principally by an economic theory substantially as follows:

Prosperity depends upon mass purchasing power, which in turn depends upon the wages paid to labor. To create prosperity, all that is necessary is to raise wages paid to labor, which will cause an increased consumption of goods, which will cause an increased demand for labor, which will increase the sum total of wages received by labor, which will cause a further increased consumption of goods, etc., until full-fledged prosperity returns.

Add to this theory, of raising wages to create prosperity, the practical expedient of reducing hours of labor per week so as to help relieve an immediate prevalence of unemployment, and we have what might once have been called the industrial religion of the New Deal.

This philosophy obtained official endorsement in the enactment of the National Industrial Recovery Act last year. It has had the whole-hearted support of President



Roosevelt. In fact, for a time his greatest hopes for restoring prosperity seemed to lie in this direction.

The religious zeal of devotees of this philosophy was perhaps best exemplified in the amazing accomplishments of General Hugh S. Johnson, blustery crusader, who climaxed his colorful career as head of the National Recovery Administration, on Oct. 1, by characterizing this philosophy as "the greatest force for social advance since Christ and the Sermon on the Mount" (somewhat difficult to reconcile with his later statements).

More reserved, and of a somewhat different character, is the devotion to this wage-raising philosophy of the Secretary of Labor, Frances Perkins. In an article published in the New York *Times* Magazine on Aug. 5, she was reported as stating: "Wage levels must be raised. Otherwise we shall have recurrent slumps when more will have been produced than consumers can absorb."

Similar is the devotion to this philosophy of men like Senator Robert F. Wagner, friend of labor of many years standing, and sponsor of the National Industry Recovery Act. On March 14, 1934, when he appeared before the Committee on Education and Labor to urge the enactment of a supplementary bill (S. 2926), he frankly admitted that his purpose in wanting to strengthen labor unions was to force another general increase in wages per hour, because, in his words: "wages are again lagging behind production and profits. If this disparity continues, we may expect another collapse."

Similar is the official endorsement of this philosophy by labor unions, like the American Federation of Labor. In its latest pronouncement, at San Francisco in October, 1934, this organization declared: "We must have a living standard which will use the capacity of our industries and the capacity of our man power." The method recommended for achieving this result was the reduction of hours and the increase of wages, described by this organization as the original purposes of the NRA. In his keynote address, William Green stated: "We stand unflinchingly for the application of the six-hour day and the five-day week in this country." Later, this stand was officially endorsed by the convention.

Many employers of labor have also believed in this philosophy of raising wages and shortening hours to create prosperity. Those employers who could not subscribe to this philosophy on its economic merits were induced to go along by the prospect of relaxed anti-trust laws and other possible compensating advantages.

At the time the National Recovery Administration, embodying this philosophy, was launched in practical form about July, 1933, circumstances were such that almost anything that President Roosevelt recommended was assured of at least a fair trial. Between March and July, a remarkable recovery had occurred. This was interpreted by the country as indicating that his guidance could be accepted without the usual questionings.

To suggest at that time, as some people did suggest, that the NRA wage philosophy was an economic delusion, which would actually retard recovery and in part nullify the progress until then achieved, made little or no impression. Cold logic was of no avail against the evangelical fervor of the NRA enthusiasm. There was nothing to do but to await the test of time.

The Transition

Gradually, business statistics became available, indicating that after each NRA wage-raising and hour-shortening drive business activity tended to go into reverse. Any of the well-known indexes of business activity show a decided slump beginning about July, 1933, and again beginning about April, 1934.

In time, the NRA lost sufficient of its popularity that it became increasingly possible to criticize it in the light of cold logic.

As late as Aug. 22, 1934, President Roosevelt still seemed to believe in the general philosophy of raising wages and reducing hours to create prosperity. On that date, he recommended to the cotton garment industry a further reduction in hours, from 40 to 36 hours per week, accompanied by a corresponding increase in hourly pay. Later, in his radio talk of Sept. 30, he seemed somewhat less sure of the soundness of this wage raising philosophy. Still later, on Nov. 2, in extending the 40-hour per week automotive code without change (refusing to accede to the demands of organized labor for a further increase in pay and a further reduction in hours), he stated: "It is not very useful to pay a man $10 a day if he is employed only 65 days in the year." He appears to have shifted his position and to be listening more understandingly to the other side of the story.

The Other Side of the Story

What is this other side of the story, this cold logic, that has already partially quenched the evangelical fervor of this particular part of the New Deal?

It is the exactly opposite theory, the theory that raising average wages per hour during a period of depression and unemployment will tend to aggravate rather than relieve the depression and the unemployment. (Or, if wages are forced up during a period of recovery from depression, the effect will be to retard recovery.)

According to this opposite theory, depression of business and unemployment of labor are the practical results of too high wage and overhead costs relatively to prices in general, brought about as follows: Prices in general collapsed, beginning in 1929, due to financial causes, principally contraction of credit money in circulation. Wage and overhead costs did not drop proportionately, with the result that profits in general gradually disappeared, which caused the partial or complete closing down of many business enterprises.

To believers in this opposite theory, it is of course ridiculous to try to cure depression and unemployment by forcing an increase in wage and overhead costs. (Government spending in general is industrial overhead, just as much as increased expenses due to complicated regulations.) On the contrary, if a proper remedy cannot be applied on the financial end to efficiently restore prices in general, the proper cure for depression and unemployment is obviously to force wage and overhead costs down instead of up. The right time to force an increase in wage and overhead costs is during a boom period, when there is a surplus of profits

and when a depressive influence on business would be healthy. Forcing up average wages per hour during a period of depression merely has the result of reducing average wages per week by increasing unemployment comparatively with conditions if wages had been left free to follow their natural course.

W. W. Atterbury, president of the Pennsylvania Railroad, expressed this opposite theory concerning forcing wages up during a period of depression and unemployment in the following words (April, 1934):

> The whole theory of the NRA, of increasing wages and shortening hours to hasten recovery, is wrong. If that theory were correct, the President should immediately impose a two or three-day week at greatly increased wages.

The General Motors Corpn., in its annual report for 1933, recognized this opposite theory in the following words:

> No greater fallacy exists today than the viewpoint held by so many —that the number of man-hours of employment is definitely fixed and, assuming that the number of workers is known, the problem of unemployment is solved by dividing the amount of work by the number of workers. Around this thinking comes the agitation for the mandatory thirty-hour week. The average hours of employment over the decade may perhaps be gradually reduced but, from an economic standpoint, an immediate radical adjustment is bound to exert a highly deflationary influence and at a time of improving conditions will surely inject into the picture a highly objectionable effect. It is to be hoped that wiser counsels will prevail.

William Randolph Hearst began fighting for this opposite theory shortly after the NRA was organized. His control of a large chain of newspapers enabled him to obtain a hearing at a time when most publishers either believed in the wage-raising and hour-shortening philosophy of the NRA or did not consider it wise to print anything to the contrary. In a front page editorial on Oct. 31, 1933, Mr. Hearst characterized the NRA as follows:

> It imposed upon industry, struggling toward recovery, shorter hours and higher pay and greater employment, and heavier burdens in every direction than industry, weakened by depression and only recently recovering, could bear. The result has been a distinct recession of the movement toward prosperity.

A typical business leader who has cooperated with the NRA program is Thomas M. Girdler, president of the Republic Steel Corpn. In an address on Oct. 5, 1934, he stated:

> Most industrialists, including those in the steel industry, have been heartily in sympathy with the administration's desire to spread wages and employment and to increase the income of the average man who is the consumer of industrial products. This is amply evidenced by the measures which the steel industry took immediately after the inauguration of its code in the direction of increased employment, increased hourly wages and decreased hours per week. Now I wish we could continue to pay these wages, or even better wages, indefinitely. But, unfortunately for the New Deal, it is one of the simple rules of economics that in order for money to be paid out, money must be taken in.

General Johnson Revises His Opinion

More remarkable is the disillusionment of General Hugh S. Johnson himself. In a press interview on Oct. 15, 1934, he recognized the unsoundness of trying to create prosperity by forcing wages up and hours down. According to the Associated Press, he stated:

> The reduction of hours, except in some industries, is not economically sound and a statute wouldn't make it so. . . . Cutting the work week to 30 hours would increase costs to the consumer 33 1/3 per cent. If you increase costs 30 per cent you'll stagnate consumption and get a depression that'll make your hair turn gray.

Asked what he would do if he were starting the NRA over again, he replied: "If I had the job to do over again, I'd resign the first day." In this interview, he also came out in favor of direct relief for the unemployed as against more expensive made-work schemes (while admitting that he once believed in a public spending program). He stated:

> There are many ways to disguise the dole but they are all too expensive in administration. The cheapest way to keep people alive is direct cash—paying people money to buy stuff to eat.

In making these comments, he explained that he was expressing "just my private opinion" which "as a private citizen now I can express." All of which leads one to wonder to what extent General Johnson in the latter part of his tenure of office may have been a soldier fulfilling orders rather than a leader motivated by personal convictions.

Another interesting statement is that of William J. Cameron, of the Ford Motor Co. In an address on Dec. 2, he stated:

> Higher wages and shorter hours cannot be established by money dipped out of a company's treasury. They come from economies, improvements and refinements of manufacturing methods, and these come from the incessant labor and creative experience of management. . . . These improvements are not born of scarcity but of plenty. The present agitation for a six-hour day grows out of a despairing belief that scarcity and poverty will be the general rule in this country for the future. No economic improvement is possible with that kind of thinking. As a share-the-work plan, the six-hour day would be a plunge downgrade. The six-hour day will come because work is plentiful and production is ample. It will come because the American ideal of life requires leisure for men to use and enjoy things they make. . . . Share-the-work plans are plausible; they appeal to our good will. But they do not help the men they are supposed to help. As a means to recovery, or even as emergency helps, they simply do not work.

Still another interesting statement is that of Alfred P. Sloan, president of General Motors, in an address on Dec. 11, in which he stated:

> We have an important and insistent demand for further reduction in hours, for a mandatory 30-hour week, to be specific, with resulting further increase in the cost of goods and services, further limitations in the ability to consume those goods and services, less jobs for American workers. . . . Let us hope that this particular experiment can be avoided. Let us relegate to the museum of economic monstrosities the theory of scarcity as a factor in promoting industrial recovery.

Appraisal

In appraising the above two contradictory theories, the element of self-interest, consciously or sub-

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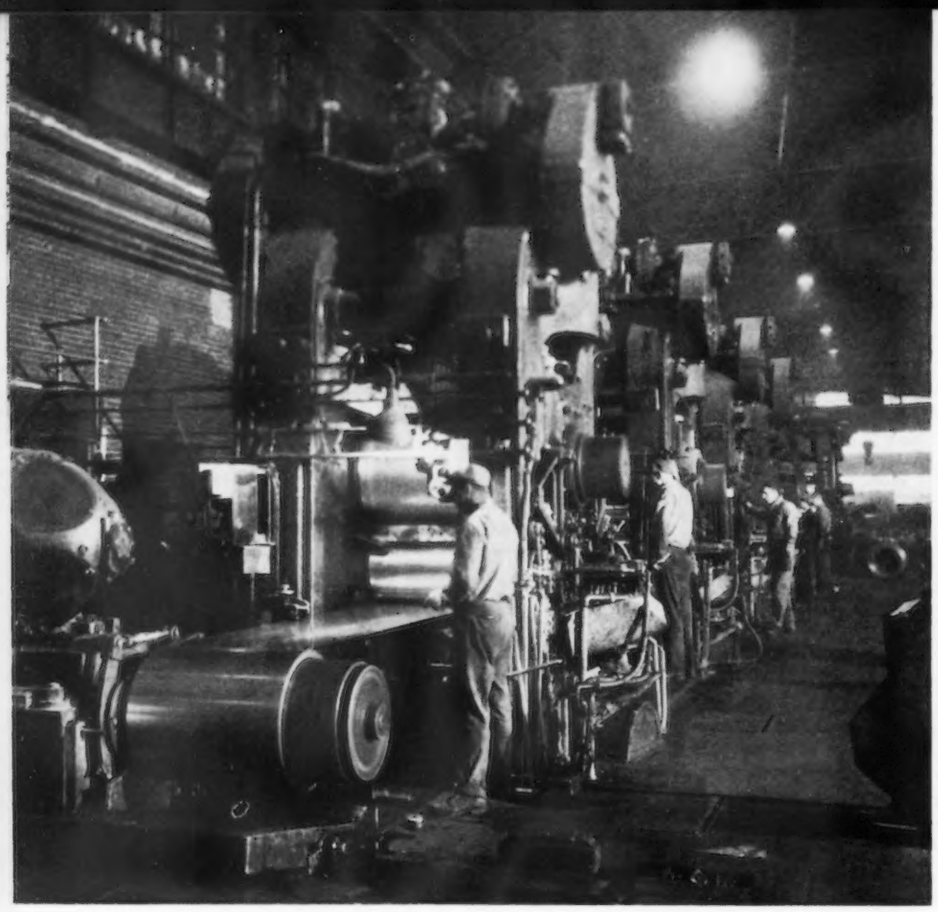

Attractive

BEFORE the end of 1935 nearly all the larger steel companies will be equipped to produce cold reduced tin plate. Coincident with this development is the improvement in the heat treatment of hot pack tin plate and the planning for aggressive extension of the tin plate market in general. Recent advances in the lacquer industry have threatened some tin plate applications and thus have caused renewed interest in the future progress in quality and economy in the tin plate industry.

This article besides describing some features of today's practice in tin plate manufacture, suggests some new applications and points out trends toward future improvements both in quality and in processing of tin plate.

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TWO important factors of industry are processes and materials. In a sense processes have occupied the limelight during recent years and now, according to many authorities, it is materials' turn. Certain it is that progress in the development of industrial processes during the past 20 years has far outdistanced the corresponding improvement in variety and character of materials. Of course the two factors often go hand in hand and a new process may make possible a new material. This was the case with nickel-clad steel and it may be the case in the near future with tin coated steel.

The tin plate industry has shown a gradual but inconspicuous improvement during the past 10 or 15 years, but it still rests on an old process and many of the traditions and restrictions of the early days still cling to the art. Despite this, no one questions the tremendous importance of tin plate in our social and industrial life, and while some markets have been lost to other methods of coating and protecting steel sheets, other markets have been found. What does the future hold for the tin plate industry? This is a question which is more significant to fabricators now than ever before.

Tin is a highly important and significant metal. For some applications practical substitutes for tin have not been found. One such application is in connection with detonators for explosives where the properties of tin with mercury are unique. Another place where tin holds its own against all threatening alternatives is the coating for sheet steel containers for food products. But here as in many other fields there can be no resting on oars.

Dr. Colin G. Fink of Columbia University has stated recently that it is now a propitious time for tin plate manufacturers to arouse themselves and throw off the yoke of tradition which has handicapped developments. He says: "There is no basic reason why tin plate of decidedly better quality than much of the tin plate turned out today cannot be uniformly produced."

An elaborate research program is now being carried out on tin and its applications to steel and other metals and it seems likely that tin plate, if it shakes off the fetters of tradition, should find an expanding market as a highly satisfactory material for the manufacture of small lacquer finished metal parts. One of the significant factors in the situation is the recent rapid advance in properties of enamels and lacquers. This advance in fact has been so rapid that tin plate manufacturers have had a difficult time meeting some of the lacquer companies' specifications. In other words, lacquers are available which after application to tinned sheets will stand up under more severe forming and drawing than will the base material.

Several avenues for improvement of tin plate and its manufacture are open. Perhaps the most important is the technique of heat treatment before tinning. Another likely avenue lies in rolling practice, to the end that hot rolled sheets may be produced in wide

Finish Helps Metal Products Sales

31—Tin Plate Today and Tomorrow

BY HERBERT R. SIMONDS

widths and with as high quality as now produced on the smaller tin plate mills. The most active approach to improvement in tin plate is of course cold reduction. The first mill for this purpose was put into operation in 1928, but during the next few years expansion of the process in the tin plate industry was delayed due to the depression and also due to improvement in properties of the hot-rolled product.

Cold reducing machinery is elaborate and expensive, as may be judged from the accompanying illustration of the new unit installed in 1934 by the Wheeling Steel Corpn., Wheeling, W. Va. It is significant, however, that manufacturers of cold reducing equipment report a marked increase in orders and that at least one company now has a full year's future production already entered on its books.

It is safe to say that all the larger steel companies are either now prepared to furnish cold reduced tin plate or else will be prepared by the end of this year.

The purpose in this article is twofold: to suggest new applications for tin plate and to point out some of the trends toward future improvement in the product itself. For both purposes a review of the high lights of manufacturing procedure seems advisable.

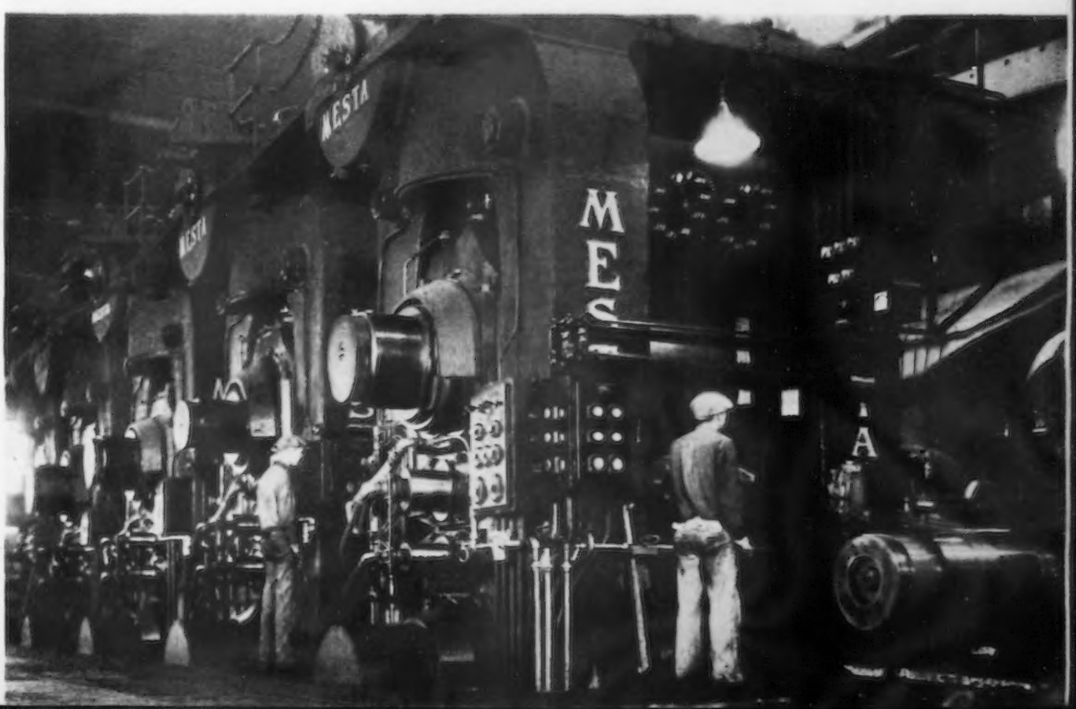
Low carbon steel bars, known as tin bars, are rolled down to tin plate gage on rugged, comparatively small tin plate rolls. The practice is to first roll two bars separately, then to place one on the other to form a pair and roll the pair, then to fold the pair back on itself to form a double and roll the double. This is repeated over and over again until many layers of

OPPOSITE PAGE

THE second and larger unit at the plant of the Wheeling Steel Corpn., at Yorkville, Ohio, for the manufacture of cold reduced tin plate was put into operation in November, 1934.

AT RIGHT

THE first tin plate cold reducing unit at the Wheeling plant was put in operation in October, 1928, and is said to be the first mill of its kind ever built.



plate, known as a sheet pack, are rolled at the same time. The packs are reheated as required, and when the reduction in thickness has proceeded to the desired point the packs are sheared and the individual plates separated.

This practice places a limit on chemical composition by the necessity of retaining enough phosphorus or silicon to prevent the sheets welding together during hot rolling. The carbon content of the bars usually runs from 0.05 to 0.10 and a high quality is maintained in the steel.

The individual plates are pickled, heat treated, then perhaps pickled again before they pass to the dipping machine. For deep drawing quality the sequence may be, hot rolling, shearing, opening, black pickling, black annealing, cold finishing, white annealing, white pickling, and then tinning.

By a curious clinging to early practice, ordinary tin plate is now called coke tin plate after the early use of coke in producing the bars. It is purchased by the box at a fairly well established standard of 31,360 sq. in. of surface to each box. The thickness of tin as well as the thickness of the steel varies. The former, which establishes the grade, frequently is equivalent to 1¼ lb. per box. A common gage or total weight is 90 lb. per box, which figures for single plate thickness about 0.01 in. Perhaps 80 per cent of all tin plate is of this standard gage and grade. The gage of the steel sheet may run up as high as 275 lb. to a box, or approximately 0.031 in. thick.

Whether the plate is cold reduced or not, the proper heat treatment is vital to the final result. The older method is box annealing, and this is still extensively used and produces a very soft, pliable product. The newer treatment known as normalizing lends itself to more rapid production and gives better deep drawing properties.

A typical annealing cycle of the Republic Steel Corpn. calls for 24 hr. to bring the tin mill plate gradually up to a maximum of 1700 deg. F. This is done in an annealing furnace with the plate packed in cast iron boxes and passing through the furnace, entering at one end and leaving at the other, in a manner similar to that of malleable iron annealing furnaces. After reaching the maximum, the temperature is gradually reduced through a period of 24 hr., at which point the boxes of plate, still hot, are moved out of the furnace and allowed to cool in the air a further 24 hr., making a 72-hr. complete cycle.

The normalizing cycle is a continuous belt process. An endless belt passing slowly through a heating zone carries the sheets one at a time in a sequence which is much more rapid than in the case of annealing. The maximum temperature, however, may reach the same point of 1700 deg. F. The sheets as they leave the belt are automatically piled up at the end and allowed to cool in the air.

One distinctive feature about normalizing is that the surface of each sheet is cooled more rapidly than the interior, and this gives a finer surface grain structure with stiffer characteristics than the softer center portion. After the tin mill plate has been heat treated either by normalizing or box annealing, it is then put through the tinning process which consists of dipping the sheets in a bath of molten tin. This is done on elaborate automatic machines which hold the plates by their edges and separate one from another throughout the operation. After dipping, the plates pass through squeeze rolls which regulate the thickness of coating. These are arranged so that any excess tin drops back into the bath.

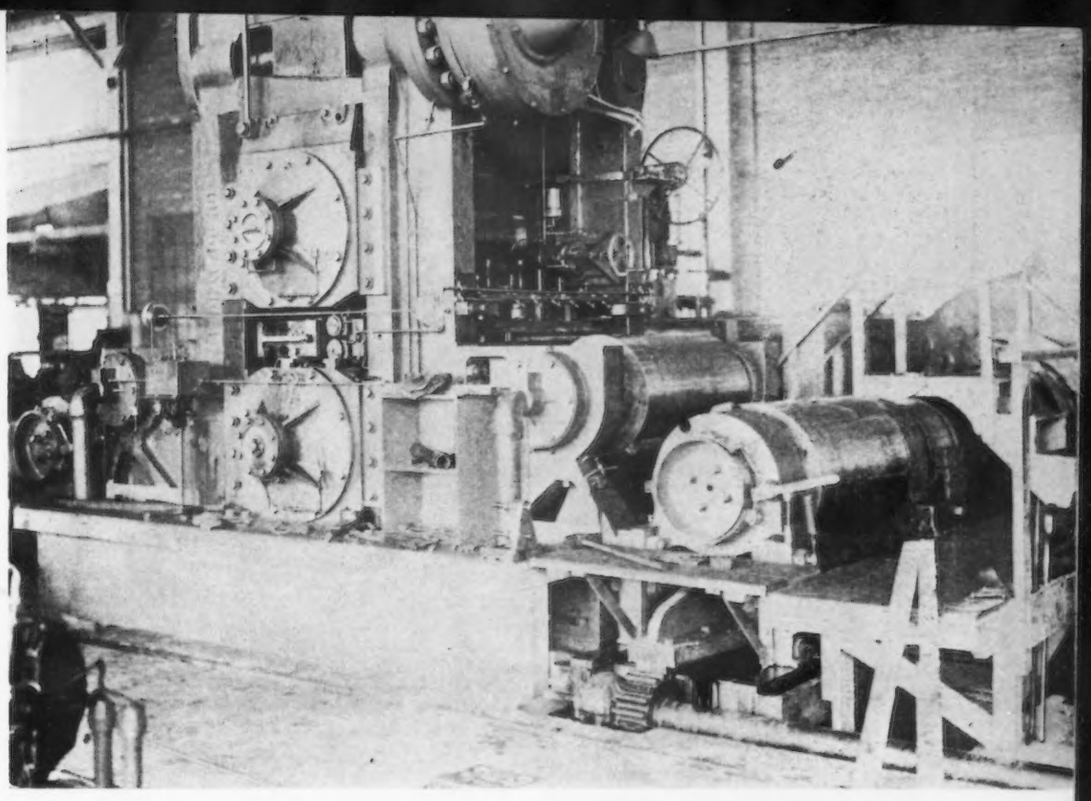
Properties of Normalized Tin Plate

H. T. Blair, metallurgical engineer, Republic Steel Corpn., describes some of the properties and uses of normalized tin plate. He says that normalizing has improved the drawing properties of the plate, with the result that breakage in fabrication has been materially reduced. Due to the grains of the normalized plate being nearly equi-dimensional and not elongated, the plate responds to drawing more nearly the same whether worked with or across the grain. Normalized hot pack tin plate nevertheless has certain limitations due to chemical analysis as already explained, and also due to gage variation.

Mr. Blair gives the following account of the experience of his company in cold reduction of tin plate. These mills reduce coils of approximately 15 gage hot-rolled strip to tin plate thickness without heat, the number of passes depending upon the type of mill used. This cold reduced plate has been found to respond to box annealing in a different manner from the standard tin mill plate. It develops a fine uniform grain structure with grains of approximately equal axes. The direction of the grains does make a difference, however, and Mr. Blair points out that this should be considered in the fabricating processes, as the more severe draw should be made with the grain. Direction of grain may be specified in purchasing.

Mr. Blair states: "In view of the more specialized nature of tin plate production now practiced, users should keep in close contact with their producers. A purchaser should not change the type of plate used without reviewing specifications and conditions with the producer and making sure that his hoped-for improvement will not be accompanied by some new trouble. It is important for the tin plate producer to have all available information regarding the final article which is to be made from

TIN plate is often annealed in cast iron boxes as shown. Some mills, however, box anneal cold reduced strip for tin plate in the coil before cutting and in such cases sheet steel boxes are used.



THIS shows the Steckel type of cold reducing mill in operation in the production of tin plate. The mill was manufactured for Follansbee Brothers Co., Follansbee, W. Va.

the plate, so that he can adjust manufacturing procedure to best meet the requirements.

Value of Cold Reducing

Tin plate produced by cold reduction has some well established points of superiority over plain hot pack tin plate. Of course it is possible to exaggerate the difference between the two and it is only natural for those with costly cold reducing machinery in operation to be enthusiastic over their product. On the other hand, producers without cold reduction equipment find that improvement in their technique at various points makes it possible for them to turn out a deep drawing tin plate which competes favorably with the cold reduced tin plate for many applications.

Some companies which are now regularly producing both types of tin plate find that the hot pack plate is holding its own in point of sales due to improvement in heat treating. Usually there is no differential in price between the cold reduced and hot pack product, and the fact that many customers continue to use the hot pack product is therefore an indication that it still has an important place in the scheme of things. Nevertheless, as already pointed out, the trend is strongly toward more extensive use of cold reducing throughout the tin plate industry and because cold drawing is a continuous process it lends itself better to a future development of the tin plate industry, as explained later in this article.

Cold rolled tin plate will stand more abuse in many types of service. Usually it will withstand a shock better than the hot pack plate and is thus more readily adapted to modern high speed punch press work. In addition, the cold reducing process gives a surface better adapted for tinning. Thus some of the claims for cold reduced plate are, more even coating, better adherence of tin to plate, more even gage, and better final appearance. For severe deep drawing the cold reduced product frequently is the only type of tin plate which can be successfully fabricated.

Use Is Expanding

Tin plate is frequently lacquered on both sides before being shipped to the fabricator, and ingenious automatic equipment has been developed for this purpose. This, combined with the new properties available in lacquers, gives the lacquered plate a much broader market, as the small manufacturer can buy the pre-finished material and can form and fabricate many parts without the necessity of subsequent finishing. Tin cans for food or other products are often prelacquered. This forms an excellent base coating on the exterior for subsequent lithograph or decorative finishing, and the interior lacquer coating gives the container better resistance to certain food acids and chemicals.

Manufacturers of lacquers and of tin plate have cooperated to produce a prelacquered tin plate of unusual quality. Thus a manufacturer of typewriter ribbon boxes now uses standard prelacquered tin plate with no more operations than he formerly used with deep draw unlacquered tin plate. Recently this manufacturer has been able to obtain a colored lacquer finish on one side of the plate which gives him an attractive appearing box without the necessity of further finishing.

Deep Drawing Properties

One of the severe taxes on tin plate in commercial use is making the familiar catsup bottle cap. These caps are pressed out of flat stock and after cupping, the already strained fibers must resist the further stress required in the forming of threads. Also, the operation must be done extremely quick in order to reduce manufacturing costs. The cold drawn tin plate is commonly called for in this service. The spouts of oil cans are another case where the very best drawing properties of tin plate are required.

A manufacturer of loose-leaf books has recently turned to lacquered tin plate for the manufacture of backing channel pieces. These are later enameled in colors, which forms a distinct change from the familiar high polished nickel plate finish. Incidentally, tin plate could be well used and in fact is used for this same type of channel when nickel plate is to be the finish.

One manufacturer advises the use of deep draw plate whenever the depth of the draw exceeds the diameter. For very severe draws cold reduced tin plate with a spe-

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THIS shows continuous pickling equipment manufactured by the Mesta Machine Co., Pittsburgh

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cial heavy coating of tin is often specified. The term "charcoal" is merely a term for a heavy coating of tin, and, as with the term "coke," has no other significance. Tin coatings range from the standard of 1¼ lb. per box up to 3¾ lb. per box, but the greater thickness is only used in highly specialized cases. Manufacturers of radios are finding tin plate a good material for many parts. Thus one manufacturer is successfully using a 90-lb. tin plate as shields for radio tubes. These are made very rapidly on automatic machines out of prelacquered commercial tin plate. The forming and drawing requirements in this particular case are such as could not have been met by the commercial grades of tin plate even a few years ago.

Tin

The United States is in the embarrassing position of being the world's largest consumer of tin while at the same time being wholly dependent upon other countries for its sources of supply. Great Britain is the second largest producer, but in recent years the United States has led that country by nearly three to one. Because of this situation and because of the importance of tin for military purposes, the War Department has long been concerned about its tin supply and recently the Government has been investigating the subject and the findings are to be published in the near future.

The present status of the problem is, briefly, that the most important tin producing countries have joined forces to regulate production and to carry on research work in the industry. The International Tin Research and Development Council, with headquarters in London, is a group set up entirely independent of any control or production phase of the subject. Its purpose is to carry on original research to help others in the industry who are doing research work, and to provide information and assistance to all interested people. This Council is supported by the four countries, Bolivia, Malaya, Netherlands East Indies, and Nigeria.

Production Regulated

These four countries and Siam have entered an agreement regulating the production in each country. The actual direction of this activity rests with the International Tin Committee which meets in London and which has advisory panels in the different important consuming countries. The whole administration of this control of the tin industry seems to be carried out on a very fair and intelligent basis, with much less fluctuation in surplus stocks, prices, and employment then before the Committee was in operation.

The annual tin production of the world now stands at about 100,000 tons as against a high figure of 187,000 tons in 1929 and a low of 83,000 tons for the fiscal year ending in June, 1933. In 1933, the consumption of tin in the United States was close to 60,000 tons as against 20,000 for the United Kingdom, and 10,000 tons each for Germany and France. The tin plate production in the United States in 1933 totalled 1,762,000 tons as against 737,000 for the United Kingdom, 204,000 for Germany, and 132,000 for France. The production outside of these four countries is almost negligible, with Japan ranking fifth with 35,000 tons. It is important to note in the case of Japan, however, that its production has been rapidly increasing. As late as 1924 this country produced no tin plate. Production started in 1925 with 6,000 tons and has increased gradually all through the depression period to the present 35,000-ton figure which is the highest in its history.

Many metals in contact with food acids develop salts or other compounds which under some conditions are injurious to health. For this reason tin, which for most purposes carries a clean bill of health, produces a desirable and unique inner coating for metal containers. F. C. Blank of the food research section of the bureau of commerce, Department of Agriculture, has made some extensive tests of the effect of tin and tin salts on humans, even going so far as to feed his assistants different tin products. As a result of all this he has put his stamp of approval on tin for use on surfaces in contact with food.

Future of Tin Plate

Almost always in modern industrial life high speed mass production means continuous operation. In such operation the raw material is held in the form of strip, bar, or wire as far down the sequence as possible. Thus in the manufacture of bolts the form of the unit is almost completed before it is cut from the rod. In the case of galvanized nails the wire from which these are made may pass through a continuous pickling, washing, and

galvanizing process, and then on directly to the wire forming machines. As against this practice, in the manufacture of small products out of tin plate the raw material is cut into small units too early in the process and it seems inevitable that this fault, which despite elaborate automatic machinery must always be a point of inefficiency, will be corrected.

Continuous tinning of strip steel is an accomplished fact at least in the laboratory, and undoubtedly such a process could be developed to a commercial point within a year if manufacturers were sure of the market. One reason this is not done is because the largest consumers, the metal container manufacturers, are now tooled up with expensive automatic machinery which is designed to handle the relatively small sheets of commercial tin plate.

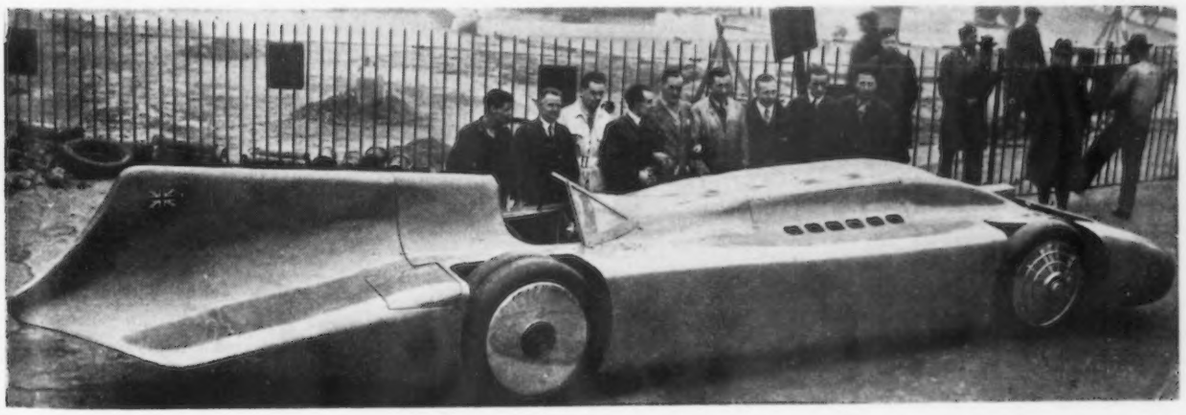
The engineer of one metal container manufacturer estimates that the improved efficiency at his plant which would result from substituting tinned steel strip in large rolls for the present box tin plate would pay for the change in fabricating equipment in from two to three years, even though this equipment is elaborate and expensive. Research work in the field of electrodeposition of tin on steel has been under way for some time and this very probably may lead to revolutionary changes in the not far distant future. A close analogy is found in galvanizing where many successful installations of electrogalvanized sheets and strip are in operation.

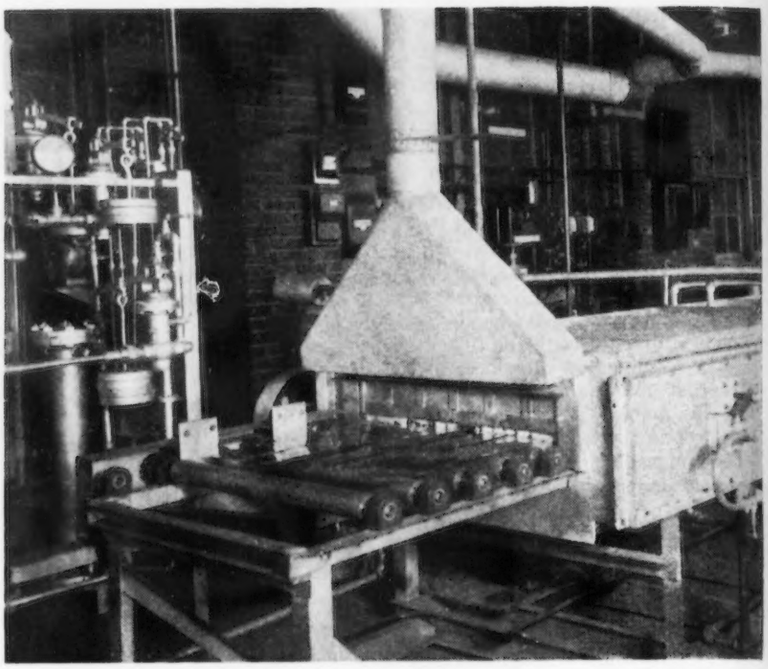
The threat of the enamel manufacturers is not viewed very seriously by most of the tin plate companies, although some of the enamel interests claim that their products have already developed to such a point that tin plate could be dispensed with in the metal container industry if necessary. It is likely that the prospect of competition from the lacquer interests will spur the tin plate manufacturers on to produce a better product and by a more efficient process.

Apparently tin plate and lacquer are supplementary. The product made from tin plate is often a better product if it is lacquered and the lacquered metal part is often a better product if it has a tin plate base. Thus the two interests might well find some good basis for cooperation, as many of the individual companies already are doing.

HERE is a break for the forgotten man who does not travel on Pullman cars. The Norfolk and Western Railroad will install a number of these "palace" day coaches early this year. They are a product of Bethlehem Steel Co. Wonder who's ahead in the bridge game?

HERE is a rather unusual view of a rather unusual automobile. It is Sir Malcolm Campbell's new Bluebird, with which he hopes to shatter all records soon at Daytona Beach. This mechanical turtle shifts into "high" only after a speed of 200 m.p.h. is reached. Sir Malcolm is welcome to it, we don't want it.





Bright Normalizing of Sheet

FOR the past 10 years steel makers have been engaging in an almost continuous struggle to improve the quality of their product fast enough to keep up with the ever more severe demands of the steel users. Larger and larger parts are being made from the material, thus necessitating wider and heavier mills. Closer tolerances as to gage across the strip or sheet have necessitated the development of the enormously large and heavy four-high and cluster-cold mills which are now being used.

Along with this demand for steel having a more uniform gage, there has likewise been a demand for steel possessing better and more uniform grain characteristics and hardness. These qualities have been constantly raised, until ordinary run-of-mill material today exceeds the "extra special deep drawing" of a few years ago, while the deep drawing steel today exceeds in workability, anything before produced. In the automotive field, the introduction of the new stream-lined body design, with its deep draws and wide surfaces bids fair to continue, for several years to come, the demand for better and better steels.

Along with the demands cited above, for wide and uniform gages and for deep drawing qualities to the nth degree, there is and always has been a demand for material possessing exceptional surface qualities. For auto body, furniture and refrigerator stock, which is finished by lacquering after being formed to shape, the demand is for sheet having an open "toothed" surface, with many minute peaks or projections interspersed with depressions or valleys uniformly distributed. This surface has the characteristic of gripping and holding the lacquer or enamel, offering great resistance to checking, chipping and peeling.

For material intended ultimately for plating, an entirely different surface is required. This surface must be mirror-smooth and clean, yet in such a condition that it will draw well in the forming dies. Any oxides, roughness or dirt on material of this class will cause imperfections or poor adherence of the final plating; hence the necessity for excellent surface in material of this nature.

In an effort to meet these various conditions, steel makers have spent tremendous sums of money and years of research but, although acceptable results have eventually been achieved, the procedure has been and remains very costly and its successful operation demands much care and supervision.

In a study of the various problems involved, it has been found that many of the difficulties are the result of the pickling operations. It has been the consensus of opinion of many of those familiar with this field that if this pickling could be entirely or partly

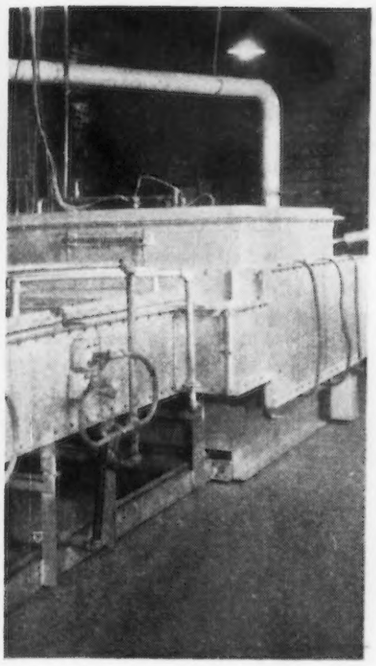


FIG. 1—Continuous controlled atmosphere electric normalizing furnace

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By R. R. LaPELLE

Electric Heating Division, Westinghouse Electric & Mfg. Co.

o o o

and Deoxidizing and Strip

eliminated, many of the troubles in the making of high-quality sheet would disappear.

In an effort to solve the problem, the Westinghouse Electric & Mfg. Co. built the experimental roller hearth type furnace shown in Fig. 1. This furnace consists essentially of a heating chamber—the enlarged portion shown at the right in the photograph—followed by a water-packeted cooling chamber for providing the rapid cooling required to produce fine-grained normalized material. The sheets are carried through the furnace and cooling chamber on mechanically driven rolls, made of heat-resisting alloy in the heating chamber and of steel in the cooling chamber.

Although no rider sheets are used, exhaustive and numerous tests have shown that absolutely no roll marking or scratching is produced on the material being normalized. An explanation of this fact lies in the explanation of the phenomena of pitting or roll marking as evidenced in the usual roller hearth normalizing furnace. This scratching of the sheets is due to the building up of oxide points or projections on the furnace rolls. These points being composed of iron oxide mixed with the usual chrome-iron-nickel oxide produced on any alloy part under oxidizing conditions, are very hard and sharp and, like teeth, dig into and mark any material passing over them. For this reason rider sheets have been almost universally used for carrying the stock through normalizing furnaces.

The experimental furnace shown in Fig. 1, however, is provided with a gas-tight steel shell and filled with a highly reducing protective atmosphere. This atmosphere is provided at all times when the furnace is under heat. As a result the rolls, which were ground before being used, have retained their original cleanliness. No oxide build-up has ever occurred on these rolls, although the furnace has been in use for more than six months and no pitting whatever is produced on the material being handled.

The controlled atmosphere used in this furnace for bright normalizing and deoxidizing is produced by processing natural gas or butane in the equipment shown in Fig. 2. The gases are then passed over oxygen-absorbing materials which remove the small quantity of residual oxygen, and, after cooling to precipitate some of the moisture present, are ready for use. The gas analysis found most satisfactory for normalizing and deoxidizing steel is approximately as follows:

	Per Cent
H_2	24
CO	13.5
CO_2	4
CH_4	3
N_2	55.5

For the handling of material which is to be afterward lacquered, as in auto body, refrigerator and

furniture sheets, the furnace is used as a combination deoxidizing and normalizing furnace. Fig. 4 shows a series of three photomicrographs taken looking down on the surface of steel which has received this treatment. Photomicrograph I (x33) looks down on the surface of a piece of material as it was received after hot rolling in packs. This material has been made from pickled breakdowns hot rolled in packs of three sheets and was brought to the normalizing process direct from the hot rolls without pickling. Photomicrograph II is a view at the same magnification of the same material after deoxidizing and normalizing. It will be noted that the surface has been apparently opened up somewhat by the deoxidizing process and that it shows the toothed appearance essential to good auto body, refrigerator and furniture stock. Photomicrograph III shows the same material, following a pinch-pass operation, which leveled the sheet and prepared it for use.

In the photomicrographs the camera was so focused that the peaks of the irregular surface presented by the steel were in focus and showed up white. The valleys, or depressions, between the minute projections are slightly out of focus and show up dark. It is interesting to note the rather uniform distribution of peaks and valleys evidenced by the steel and the irregularity of the shapes of the peaks, indicating, as was afterward proved by test, that the material, in the condition as it comes from the pinch rolls following deoxidizing, is highly suitable for lacquering purposes. In appearance, this sheet, which has not been pickled but merely deoxidized, presents to the eye, after pinch rolling, almost an identical appearance to that presented by high-class pickled sheet.

For handling bright cold-rolled material such as is used for parts afterward to be plated—as well as for certain other finishes—the furnace is used as a bright normalizing furnace.

In the continuous furnace shown in Fig. 1 and with the gas as given above, samples of polished cold-rolled material were produced. Fig. 3 shows an interesting view of this material, indicating the brilliance of the surface left after normalizing. This material, in addition to retaining the brilliance of surface usually associated with cold-rolled material, now possesses the ability to take severe drawing operations, resulting from the normalizing treatment it has received.

It thus presents a markedly superior material for all uses where great brilliancy of surface finish must be combined with the extra deep drawing qualities associated with normalized material.

It is difficult to generalize with regard to the savings to be expected through the continuous bright normalizing and deoxidizing of sheet and strip steel. This difficulty is due, not only to the fact that the costs of electricity and gas vary widely in different localities, but also is due to the extent to which the cost of such items as pickling, rider sheets, maintenance, etc., enter into the figures. Any cost comparison must be based on a summation of the cost of the various items which are listed below and which are required under the two alternate methods of producing the product.

CONVENTIONAL GAS-FIRED NORMALIZING FURNACE

1—Fuel
2—Labor, including that of handling and returning rider sheets.
3—Rider sheets.
4—Pickling, including power, materials, labor and maintenance.
5—Maintenance of the furnace and alloy parts.
6—Losses due to rejects caused by

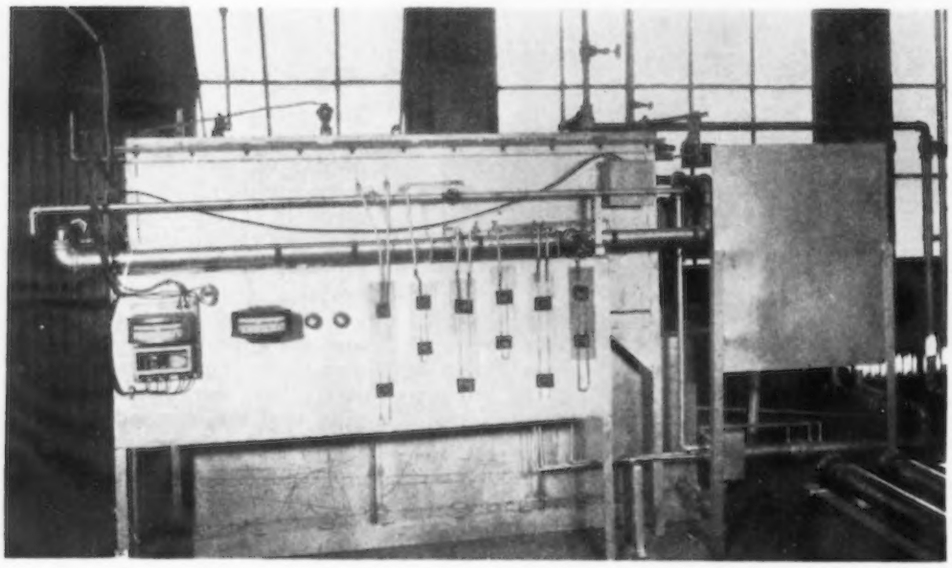

FIG. 2

FIG. 2
Natural gas combustion equipment.

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FIG. 3
Bright normalized cold-rolled steel.

either the normalizing or the pickling operation.
7—Overhead and fixed charges.

ELECTRIC, CONTROLLED ATMOSPHERE NORMALIZING FURNACE

1—Electricity for fuel.
2—Gas for atmosphere.
3—Labor of handling the material without rider sheets.
4—Maintenance of furnace and alloy parts.
5—Overhead and fixed charges.

In a comparison of the cost of producing bright cold-rolled and deoxidized sheet and strip by the two methods described above, and being guided by the results of numerous experimental runs, it has been demonstrated that the saving obtained through the use of the new process will amount to from $2.25 to $3 per ton of steel produced. In the case of one rather large unit which was carefully investigated, the savings were sufficient to repay the entire investment charges during 12 months of operation, based on operation of the equipment at only 75 per cent of the available capacity.

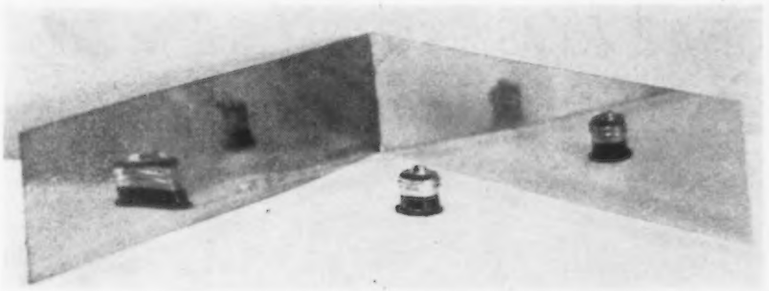

FIG. 3

In addition to tangible savings in the order enumerated above, there are large additional intangible savings resulting from the use of the new process. These accrue due to the improved control of grain size obtainable through single sheet normalizing instead of normalizing in packs, the closer control of temperatures possible in the electric furnace and the greater ease of controlling the cooling cycle so as to produce both the desired grain size and the desired Rockwell hardness in the finished material. Finally, the pickling tanks have been entirely removed from the process, along with their attendant evils of high plant maintenance, due to acid fumes and generally unpleasant working conditions. By thus eliminating the pickling operation, the numerous difficulties due to imperfect pickling, bad and off-color sheets, etc., have been eliminated, and by combining the normalizing and pickling operations into one automatically controlled process, the human element has been almost entirely removed. This assures a production of uniformly high-quality material with a minimum amount of supervision and difficulty.

In this connection, it is interesting to note that the experimental furnace unit shown in Fig. 1 is serving as a sort of test laboratory in which the possibilities of continuous bright normalizing of sheet and strip can be thoroughly explored. The furnace is large enough to take sheets up to 30 in. in width and is thus capable of deoxidizing and normalizing material of sufficiently large size to permit practical tests to be made on the resultant product. Such experimental work is serving to take the guesswork out of the new process and has made it possible to predict accurately the savings in cost and the improvement in quality to be expected through its use.

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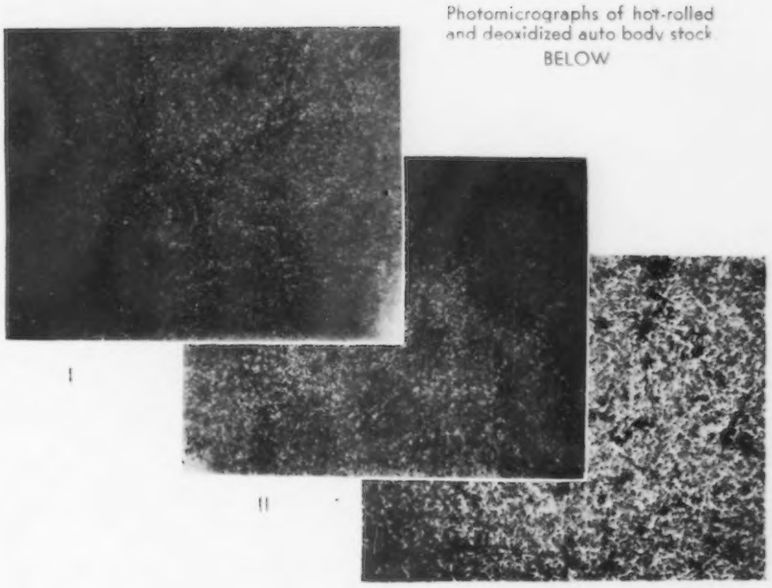

FIG. 4
Photomicrographs of hot-rolled and deoxidized auto body stock
BELOW

I—Hot-rolled steel as rolled (x 33).

II—Hot-rolled steel deoxidized in controlled atmosphere normalizing furnace (x 33).

III—Sample shown in II after skin passing (x 33).

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Cannon Specifications in the Revolutionary Days

° ° °

By H. R. SPENCER

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THAT the troubles of an Ironmaster are as old as the craft is evident from the specifications for the cannon which the Commissioner of Revenue, Tench Coxe (there being no Navy Department as yet), purchased for the 44-gun frigates Constitution, Constellation and United States, by a contract with "the company of owners of the furnace Hope," dated the eighth day of August, 1794, and a similar contract executed the 25th of October, 1796, with Samuel Hughes of the Cecil Co., Harford County, Md. The first contract was for "34 iron cannon to carry iron ball of 32 lb., and 34 like cannon to carry iron ball of 24 lb.," at the price of $106.66 per ton, finished weight. The second contract was for smaller guns, 24 nine-pounders, 12 six-pounders and 40 twelve-pounders, all at $133.25 per ton finished weight. A thirty-two pounder was expected to weigh 5500 lb., and a twenty-four pounder 5000 lb.

There appeared to be some doubt about the ability of the furnace Hope to bore out the cannon from the ingot, instead of casting them in shape, as if it were the first time the practice had been tried in this country, for the fifth paragraph says:

Cannon Were Cast Solid

"The cannon are to be cast solidly, with a sprue head of metal of at least 500 weight, and to be bored out with machinery. An allowance of the extra expense of such boring out, over and above that which would arise from casting with a cavity nearly of the size of the intended caliber, shall be made by the United States, if on a consideration of the said expenses, and all advantages and disadvantages attending the operation, it shall appear that any thing ought to be paid on the score to the contractors by the United States. It is further agreed that if, on experiment, it shall be found impracticable to make the cannon upon the plan of casting them solidly, they shall then be cast in the usual manner, but with a sprue head as before specified."

Apparently the experiment was successful, as the contract of but two years later specifies simply, "That the said cannon shall be cast in the solid, and bored."

After the gun was finished, the measurements were checked and the various sand-holes, gas pockets, mis-runs and cold-shots compared with the legal allowance for such things. The tests specified:

"That the guns, after having been bored, and before undergoing

any proof, shall be examined by one or two persons, to be appointed by the President of the United States, in the presence of such other persons as shall be named by the owner of the works. That this examination shall commence by a verification of the diameters of the different parts, and ascertainment whether there are more internal and external cavities or defects than are specified in the annexed table, exhibiting the defects which are to be tolerated.

Reboring Permitted

"That in all cases where the bore or caliber is found to be less than the diameter prescribed, and the defects not greater than those tolerated, the cannon shall be returned to the boring machine to be enlarged before being proved; and in all cases where the defects are greater than those tolerated, the examination shall cease, and the cannon be rejected.

"That the instruments commonly employed to ascertain dimensions and discover cavities or holes, in the external and internal parts of guns, shall be used on such occasions.

"That the touch hole must end in the cannon, at the middle of the rounding of the angle at the bottom of bore. That should any holes be found in the touch hole, deeper than the 20th of an inch, the cannon cannot be admitted to proof till the same shall have been filled up with beaten iron.

"That the trunnions must be perpendicular to the vertical plane, which is supposed to pass through the touch, and to cut the bore into two equal parts. That the upper part of the trunnion shall be level with the centre of the caliber, or bore, and that the usual relative weight be preserved between the breech and chase.

"Proof by Powder"

"That the proof by powder shall be as follows: viz. Each cannon shall be proved by two successive discharges. The weight of the powder, for the first discharge, shall be equal to two-thirds of the weight of the ball; and for the second equal to half the weight of the ball. The cartridge shall be well rammed down, with a wad over it; two balls shall be placed over that, with a wad of hay between them, and a wad over, which shall be well rammed down, the balls to be measured, so as to allow a sufficient windage, and approved of by the officers who shall make the experiment, and the owner of the works, or any person whom he may appoint for that purpose.

PRIMARILY, The Iron Age is engaged in writing the current history of the metalworking industry and in reporting new developments. Occasionally, however, a bit of ancient history is not amiss, especially when it is as interesting as the accompanying article. Here we find a rather illuminating picture of the art of cannon making back in 1794, in connection with guns made for the Constitution and other frigates.

"That, to ascertain the strength of the trunnions the cannon must be placed on two pieces of wood, having indentions large enough to receive two-thirds of the trunnions, and with the hinder part at a sufficient distance from where the trunnions lodge so that the breech may be inclined in any direction, but never so as to rest on the ground. The proof by powder must be made on these pieces of wood.

"That the cannon which shall have stood the proof by powder shall be raised from off the temporary carriage and placed upon a supporter, so that they may be filled with water. That should the water, on being compressed, filter through any part of the cannon, it cannot be received, though it has stood proof.

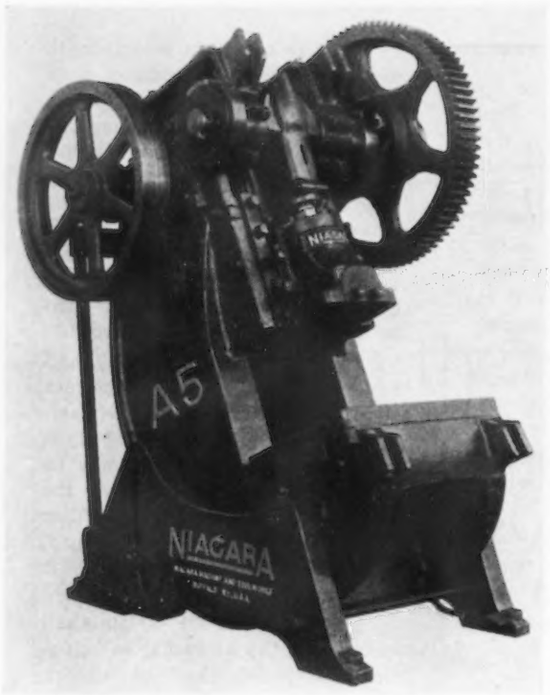
"That the cannon which shall have stood the aforesaid examination and proofs shall be subject, nevertheless, to be reexamined; and should new holes be detected, or the ones tolerated found to have been enlarged by the firing, all such cannon must undergo a second proof, but of one discharge only; when, if the holes exhibit no further enlargement, they shall be admitted, and receipted for, after being weighed.

"That the weight of each cannon received shall be marked on the left trunnion."

Munitions Tolerance of 1794.

"DEFECTS TO BE TOLERATED IN CANNON FOR THE USE OF THE MARINE OF THE UNITED STATES"

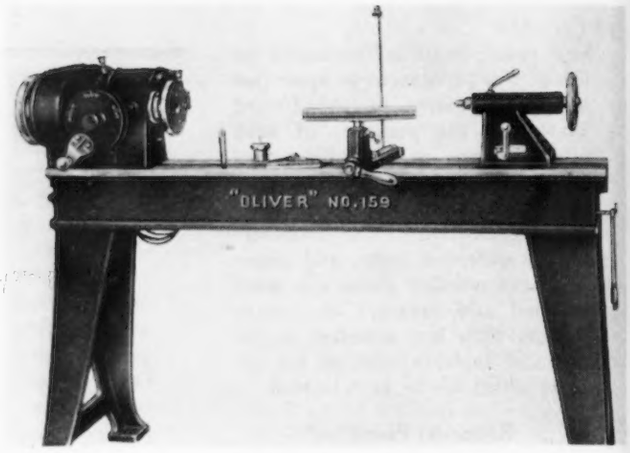
	Tenth of an Inch
Bore:	
More than the prescribed diameter	1
Less than the prescribed diameter	½
Interior Holes:	
Depth of the interior holes	2¼
A succession of little holes, one of which will be	1½
Exterior Holes:	
Upon the reinforce	
In a direction towards the muzzle	2¼
In a direction parallel with the surface	4
A succession of little holes, one of which will be	2
Upon the volu or chase	
Directed towards the muzzle	2½
In a direction parallel with the surface	4½
A continuation of little holes, one of which will be	2
Upon the hind and under part of the trunnions	4
A tenth of an inch more will be tolerated upon the front and upper part of the trunnions.	
Holes at the Edge of the Muzzle:	
If they are in a direction towards the muzzle, and if they are eight-tenths of an inch deep, the cannon cannot be received.	
It shall also be refused if the holes are six-tenths of an inch deep, and are directed towards the muzzle.	
Touch Holes:	
Upon the exterior position of the orifice	1½
Upon the diameter	
More than	½
Less than	¼
Upon the interior orifice	
In front of the point where it ought to be	2½
Behind the same	1½
The holes in the interior part of the touch hole, those one half-tenth of an inch deep.	



ABOVE

Inclinable Power Press of Improved Design Has Steel Casting Frame—A clutch of quick engagement type is employed and features in the productive capacity of the machine through the avoidance of lag prior to clutch engagement.

See page 34, column 1.



New Speed Lathe Has 800-2400 r.p.m. Range—This machine is particularly designed for pattern shops, schools and similar use. It embodies many of the features of accurate production tools.

See page 34, column 2.

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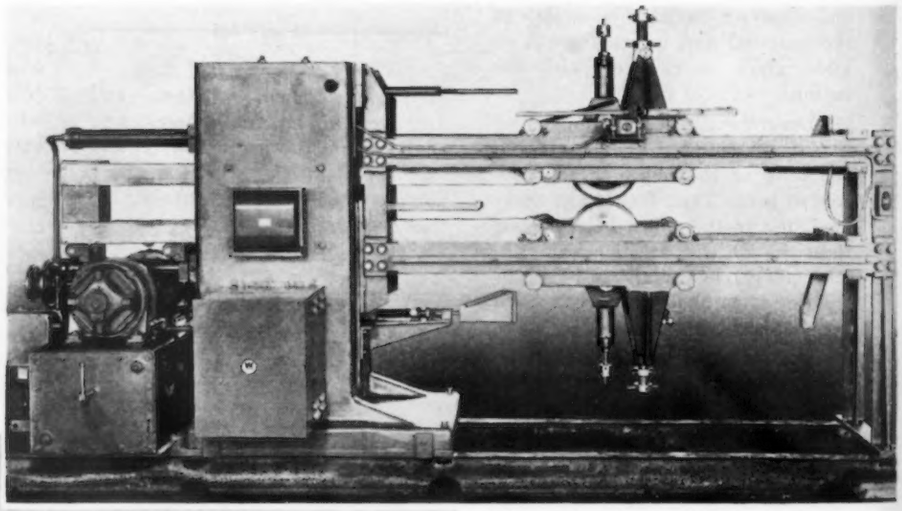
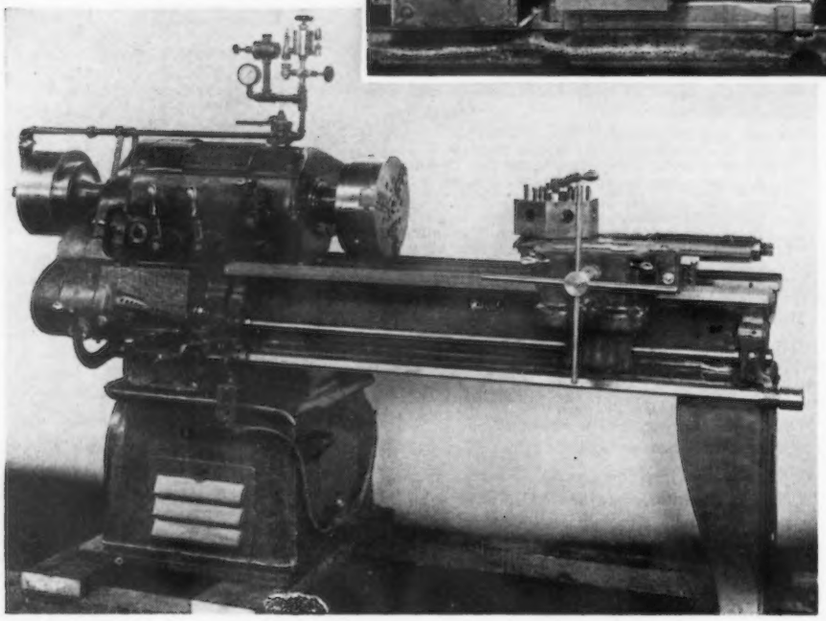




ABOVE

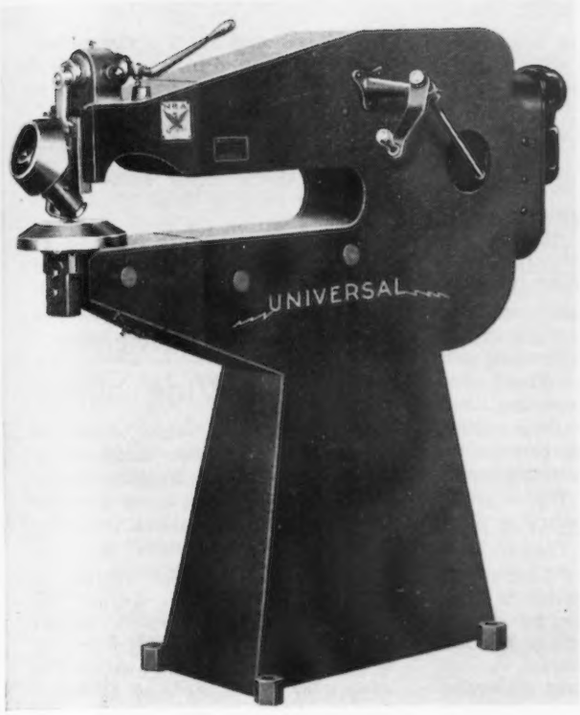
Special Seam Welder for Extra Wide Sheets—Two traveling welding rolls provide contact both above and below the seam to be welded.

See page 34, column 3.

AT LEFT

Production Lathe for Limited Requirements—This turret equipped lathe is designed for the many production jobs which do not call for investment in wider range and more expensive machines.

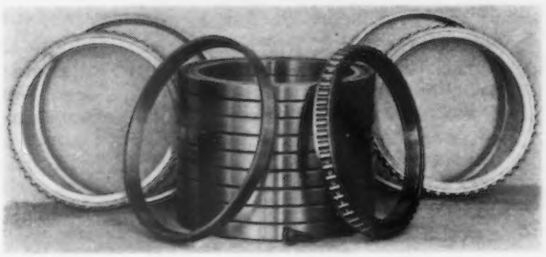
See page 34, column 3.



ABOVE

New Rotary Shear With Wide Utility Range—The specified operations for which this machine and its equipment are designed, cover small production, maintenance, samples, models, .etc.

See page 35, column 1.



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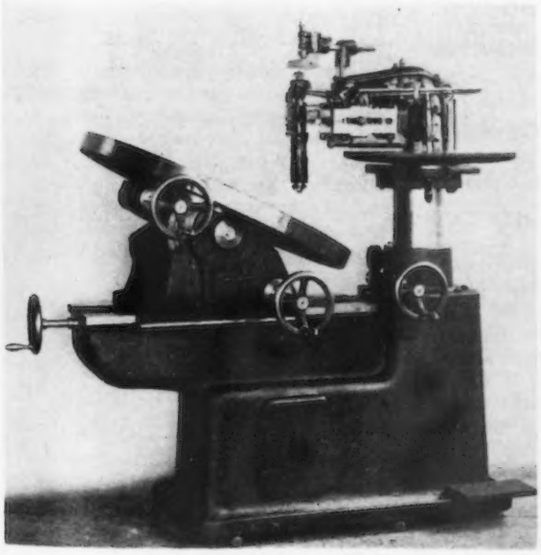
Roller Bearings for Heavy Radial Load—These bearings have been applied to massive machine tool production equipment recently described in THE IRON AGE.

See page 73, column 1.



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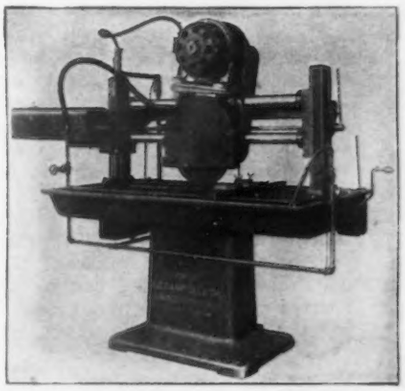
Pantograph Machine Sensitively Controlled—This new equipment features provision for either automatic or manual control over die sinking, profiling, and engraving operations.

See page 35, column 1.



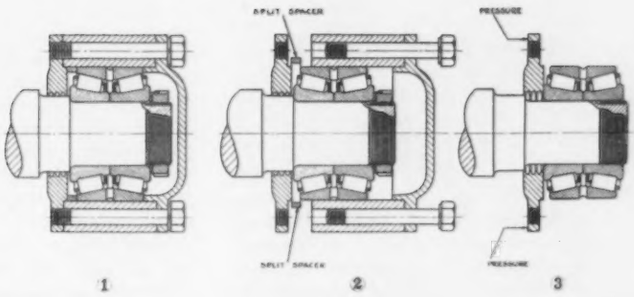
Abrasive Disk Machine Cuts Flat Materials—The range of materials for the cutting of which this machine is adapted is wide. Suitable cutting feeds are provided for extreme conditions involved.

See page 35, column 2.

AT RIGHT

Removing Timken Non-Adjustable Bearings—The maker of these bearings provides for facilitating their removal by a specified procedure which avoids the use of force.

See page 35, column 2.



Inclinable Press of Improved Design Has Steel Casting Frame

NIAGARA MACHINE & TOOL WORKS, Buffalo, N. Y., has brought out an improved press, No. A-5, having a 5-in. diameter shaft. The equipment is illustrated on page 32. Improvements include a one-piece steel-casting frame designed for a high factor of safety, with reference to strength, for maximum rigidity vertically, horizontally and torsionally; and to provide rigid gib mountings, upper bearings and back shaft mounting, together with increased stiffness of bed.

The crankshaft, which is forged, turned and ground, has a 6¼-in. crankpin, and runs in bronze bearings which are split at an angle of 45 deg. from the vertical, so as to transmit the entire thrust direct to the frame, rather than partly to bolted caps.

The press is equipped with a six-point engagement pin clutch, providing quick engagement and increased strokes per minute because of the greater number of engagement points. A safety stop prevents repeating over-travel of the shaft, and a device to lock the clutch pin out of engagement when setting dies is provided.

The six-point engagement wheel facing is made of solid hardened and ground alloy steel forging. It is dismounted by removing six free fitting through-bolts having special shaped heads and so designed that four of them act as forward drivers and two of them as backward drivers. No fitting is required. Renewal of wheel face renews all working surfaces. The clutch pin and spring can be inspected or replaced without removing the wheel from the shaft.

The brake is equipped with a spring that automatically compensates for expansion due to heat of operation and for wear. The block and band are suitably marked to indicate the correct adjustment of the brake. The slide is extremely rigid and has generous support for the die, especially from the center of the slide forward; the solid casting of the slide itself is brought forward, thus furnishing a solid backing for the mounting of dies. On the bottom of the slide there are in addition to the main hole in the center of the slide two holes at the back, one in the front and two on each side for attaching dies.

A new "breech block" type of die clamp is used. It is cylindrical in shape and is ground to close tolerance and fits in a smooth-bored hole, the center of which is sufficiently above the bottom of the slide to prevent sagging. Being contained within the slide, it has no vertical play and gives solid support to the die under pressure.

Triple V-gibs on each side of the slide are designed for rigidity and to provide adequate bearing surface; the gib bolts are placed close to the slide, thus receiving their load directly. The gibs are adjustable for wear and can be repaired or replaced without remachining the entire frame.

The back-gear shaft is of large diameter and runs in Timken bearings. The back shaft with its bearings is mounted in a heavy rigid tubular casing which provides a self-contained assembly. The entire driveshaft assembly is held in position in the press by entering it through two holes, bored in the frame at the same setting used in boring the main bearings, thus assuring alinement and eliminating loose caps, brackets, bolts, etc.

The inclining device is equipped with anti-friction thrust bearings and is located sufficiently high above the floor to permit erect operating position. All parts, including adjusting screw, are so designed as to be above the floor line, even in the inclined position.

New Speed Lathe Has 800-2400 r.p.m. Range

OLIVER MACHINERY CO., Grand Rapids, Mich., announces the No. 159 motor-in-head, V-belt driven, adjustable headstock speed lathe shown on page 32. Primarily these are pattern shop lathes, suitable for school shops and home as well. Capacities are as follows: 12-in. diameter swing over bed; 10½ in. over the hand-tool rest, and up to 24 in. long on 48-in. bed. Headstock adjustable to any speed from 800 to 2400 r.p.m. by shifting a lever at the side of the head block. The steel spindle is finished and ground, is mounted on ball bearings, has a hole through its entire length and is fitted with a Morse No. 2 taper at the front end. The 1⅛-in. diameter spindle nose is threaded front and rear for faceplates and is provided with plunger lock to hold spindle while positioning faceplates. Standard, self-ejecting type tailstock is used. Eccentric clamping type tool rest holder can be clamped anywhere on the bed. The bed is a stemi-steel casting, box ribbed, and has a standard flat top 48 in. long, 6 in. high and 6 in. wide. Height from floor to center of spindle is 42⅜ in. when standard legs are used. The equipment includes a standard Oliver ball-bearing ½-hp. motor mounted directly in back of head block; the switch is within the headstock and is operated by an indicated control handle.

Special Seam Welder For Extra Wide Sheets

THE resistance welder shown on page 32 has been designed by the Thomson-Gibb Electric Welding Co., Lynn, Mass., to simplify the problem of welding together extremely wide sheets of metal.

While seam welders operate in many ways, they are usually designed so that the work passes between stationary welding rolls or a traveling welding roll moves the length of the seam over a copper mandrel. The first type is used only when the work is easy to handle; the second has a limit beyond which the arm or mandrel cannot be extended.

This wide sheet seam welder is designed to handle work which does not conform to the limitations of either of these types. It employs two traveling welding rolls which provide the contact above and below the seam.

The problem of connecting the traveling rolls to the transformer was overcome by making them an extension of the transformer secondary. When the machine is in operation the entire unit, consisting of the transformer secondary and welding wheels, travels the length of the seam propelled by an oil gear.

Production Lathe for Limited Requirements

REED PRENTICE CORPN., Worcester, Mass., are builders of the 14 in. x 6 ft., eight-speed, sliding-gear-head production turret lathe pictured on page 32.

The construction incorporates the headstock with a self-contained cabinet-leg motor drive and quick-change gear mechanism for feeds only.

The power feed bed-turret has both forward and reverse feeds for drilling and reaming operations. A 12-in., three-jaw, steel body combination air chuck operates through 10-in. rotating, double-acting cylinder with reducing valve and automatic lubrication unit.

New Rotary Shear with Wide Utility Range

WELDED plate construction is employed in the building of a new universal rotary shear announced by the Quickwork Co., St. Marys, Ohio. The machine is shown on page 33. A full line of attachments permits the following operations: Straight line cutting, in long sheets, irregular openings and circles without cutting in from the side, odd cutting with short radii to either right or left, strip slitting and flanging any gage metal within specified capacity.

Throat depths are 30, 48, 60 and 84 in. Shearing capacity, No. 16-gage and 12-gage; flanging depth, ¾ in. in No. 20-gage or 16-gage. When shearing or flanging alloy steels such as stainless, monel metal and high-carbon stock, the maximum capacity of the shear decreases directly as the tensile strength of the metal increases. The equipment is supplied in hand drive, belt drive or motor drive. The sub-base can be wheel-mounted for portability.

Pantograph Machine Sensitively Controlled

THREE-DIMENSIONAL universal pantograph machines, illustrated on page 33, are being offered by the Marquette Machine Co., 3824 West Washington Boulevard, Chicago. The machines are adapted to die sinking, profiling and engraving, and can be operated either automatically or manually. The automatic equipment is said to be extremely sensitive and it consists essentially of an electrically controlled tracer system in which a selenium cell plays an important part. All lead screws required for movement up and down, right and left and in and out, are controlled automatically. This machine copies from masters in a one-to-one ratio and in reduction from two to one, to twelve to one. Soft masters, or models, can be used.

Cutter capacity of the No. H-3 model, shown on page 33, is from ⅛ in. to ⅜ in. Either straight or taper shank cutters can be used. Jobs up to 20 in. by 30 in. can be profiled or engraved. All motors are of the reversing type and a motor-generator set is not required. The pattern table is mounted on the right side of the column and it has a 12-in. adjustment by means of a hand wheel. This machine is rigidly constructed and it is designed for accurate work, the lead-screw dials being graduated in 0.001 in.

Abrasive Disk Machine Cuts Flat Materials

ALTHOUGH designed primarily for making long cuts through flat or slab stock, this Model 302 horizontal wet abrasive cutting machine cuts bar stock also. The equipment, built by the Andrew C. Campbell division of the American Chain Co., Inc., Bridgeport, Conn., is shown on page 33. The following flat materials are enumerated to indicate machine range: glass, porcelain, brick, stone, tile, steel, copper, cast iron, hardened steel and alloys of many descriptions.

The feed is hydraulic and is said to be designed to permit the cutting of larger flats than has heretofore been considered practicable. At the same time it permits very wide variations between maximum and minimum cutting rate—a feature of importance in the cutting of fragile materials. Cutting is done by a thin revolving abrasive disk covered by a continuous and uniform application of coolant by a special method, which eliminates dust and grit-laden air and which was described in THE IRON AGE Nov. 29, 1934.

Removing Timken Non-Adjustable Bearings

THE dismounting of non-adjustable NA type Timken bearings is described by the manufacturer, Timken Roller Bearing Co., Canton, Ohio, in conjunction with drawings on page 33.

A two-row bearing of this type is shown in the left-hand illustration (1) mounted in a solid housing. The cones are pressed in place with a tight fit, the inner cone seating against a shoulder on the shaft. The abutting cone faces are ground at the factory to provide the proper running clearance. The cup is located in the assembly by means of a split spacer ring on the inner end and a follower on the cover plate on the outer closure, as shown in the illustration.

This type of bearing is easily and quickly removed from the housing and shaft for inspection or salvage if pressure is applied only to the cone surfaces. Should pressure be applied through the cup, the resultant forces acting through the rollers, due to their tapered construction, would tend to hold the bearing in place and it would take approximately three times as much pressure to remove the bearing as is required when pressure is applied only through the cones.

At (2) is illustrated the first step in removing a bearing of this type. When the through bolts are loosened the outer cover plate and bearing housing may be stripped off easily. This releases the split spacer ring which locates the bearing at the inner end.

The lock nut and tongued washer which clamp the cone to the shaft are next removed (2), and when the split spacer ring is taken off, the inner closure plate may be brought forward, contacting the inner face of the inner cone. As both cones are in contact, continued application of pressure on the inner closure plate will slide the entire bearing assembly off the shaft smoothly and with a minimum of force (3). No pressure will be transmitted through the cup and rollers as the bearing has a definite amount of running clearance.

Machine Tool Show To Be Largest Yet

THE Machine Tool Exposition to be held in Cleveland from Sept. 10 to 21, inclusive, will be by far the largest exhibition of machine tools and accessory products ever held in the United States and almost certainly the largest industrial exposition to be held in this country in 1935, it is stated by the National Machine Tool Builders' Association.

Applications for space, it was said, require a total exhibit area more than 50 per cent greater than the total space occupied by all companies exhibiting in the last Machine Tool Exposition, held in the fall of 1929. Space laid out in the underground exhibition areas of Cleveland's Public Auditorium, comprising the North Exhibit Hall, the Arcade and the upper and lower exhibition halls, was adequate only for the needs of member companies, although it had been contemplated that these areas would be sufficient to house the entire exposition.

It was therefore determined by the association to lease all additional exhibit space available in the Public Auditorium, to accommodate companies in the accessory field, and to this end space is now being laid out in the main exhibition hall, also underground, and in the arena, which is on the street level. It is believed by the association, on the basis of applications already received from accessory companies, together with further applications anticipated,

[CONCLUDED ON PAGE 73]

Metallurgical Advisory Board Reports Year's Developments

Researchers Review High Purity Iron, Deoxidation, Iron Oxide Control and Constitution of Fe-Mn And Fe-Mn C Alloys

THE making of good steel depends primarily on integrated research. To take full advantage of recent developments resulting from this type of research, over 400 metallurgists responded to the invitation of the Metallurgical Advisory Board to attend its eighth annual open meeting, which was held in Pittsburgh on Feb. 8 at the Carnegie Institute of Technology.

A final report on the constitution of iron-manganese and iron-manganese-carbon alloys was presented by F. M. Walters, Jr. The constitution, behavior, preparation and properties of high purity iron were discussed by Cyril Walls; B. N. Daniloff reviewed the effect of deoxidation on the aging of mild steels; C. H. Herty, Jr., described the effect of deoxidation on the impact strength of carbon steels at low temperature and also the effect on the rate of transformation and grain size. The extensive subject of steel deoxidation was completely reviewed, and a mass of data concerning the control of iron oxide in the basic open-hearth process was also presented by Dr. Herty.

Eminent metallurgists of the steel industry were present to formally discuss the findings of the Carnegie investigators. Among these were Edgar C. Bain, J. B. Austin, and C. D. King of the United States Steel Corpn.; W. P. Sykes of the Cleveland Wire Works, Louis Jordan of the United States Bureau of Standards, J. D. Gold of the Weirton Steel Co., A. B. Kinzel of the Union Carbide and Carbon Laboratories, A. D. Shankland of Bethlehem Steel Co., Phillip Schane, Jr., of Carnegie Steel Co., H. W. Graham of Jones & Laughlin Steel Corpn., E. H. Hollenbach, Bethlehem Steel Co., and L. F. Reinartz of American Rolling Mill Co.

As originally conceived in 1926, the metallurgical advisory board was to supervise a five-year program on the study of the physical chemistry of steel making with particular emphasis on the study of non-metallic inclusions. This latter subject required a great amount of painstaking original investigation, but the results obtained were noteworthy. One outcome was the determination of the most suitable proportion of manganese to silicon in deoxidizing alloys to give fusible inclusions which will coalece and separate quickly into the slag. This was said to be the most economical type of deoxidizing alloy available for this purpose. A spiegel or silicon manganese alloy containing from four to five parts of manganese to one part of silicon was stated as the most effective.

For the past four years numerous plant tests have been under way with the object of testing and adapting the use of this deoxidizer to open-hearth practice. Indications are that it is practicable to make cleaner steel at lower cost by the use of a deoxidizer of this type than to use ferromanganese and ferrosilicon separately in finishing a heat.

The original five-year research program of the laboratory was completed in 1931, and an additional three-year schedule of investigation was initiated. This new research has included a study of steel refining in the open-hearth, control of oxides in slag, strong deoxidizers, elimination of non-metallic matter, and the determination of the effect and action of gases in steel. The accomplishments resulting from research on these general problems occupied most of the Feb. 8 meeting of the advisory board.

Following the welcoming speech by Frank N. Speller of the National Tube Co., Pittsburgh, R. F. Mehl, director of the metals research laboratory, gave a brief report on the progress made since the last meeting of the board. The various projects now being studied in the Carnegie Laboratory are classified under four major heads, namely plastic deformation of metals, precipitation from solid solution, oxidation of metals, and diffusion in metallic alloys. Following this summary, F. M. Walters, Jr., formerly of the laboratory staff, offered a final report on the alloys of iron, manganese, and carbon, which he investigated for a period of several years.

High Purity Iron Discussed

The preparation, properties, and constitution of high purity iron were then reviewed by Cyril Wells, of the metals laboratory. Inasmuch as very little is known of iron in a really pure state the first step of the Carnegie metallurgists was to analyze the many types of so-called pure iron which were available. A type made in Germany and known as "carbonyl" was finally selected, and a special furnace was designed to remove the impurities which still remained, i.e., carbon, oxygen, nitrogen, sulfur, and minute quantities of several other elements.

The iron was purified by placing it in a furnace and heating it to just below its melting point, during which time a stream of purified hydrogen was passed over the sample. To prevent the iron being contaminated by the furnace, the research men who designed it

used as an enclosure for the sample an iron tube that previously had been purified by the hydrogen treatment. The stream of hydrogen passing over the carbonyl iron removes practically all of the carbon, oxygen, and nitrogen in the sample by combining with these unwanted elements.

The result of this treatment is an iron which by chemical and spectroscopic analysis contains extremely small quantities of impurities. The iron, according to Dr. Wells, is probably better than 99.95 per cent pure. The impurities still remaining—silicon, nickel, manganese, chromium, and copper—are present in such small quantities that they can be determined accurately only by spectroscopic methods. These elements are present in quantities not more than a few parts in a million.

About 3 lb. of iron has been made at one time by this purifying process, in comparison with the few ounces which are usually obtained by other methods. It is this production of large quantities of pure iron which is most startling about the Carnegie process.

Having secured an iron of such high purity the next step was to subject it to standard tests used by metallurgists to determine properties of metals. One of the most common of these tests is the measurement of the expansion of iron when it is heated, and a special dilatometer of high accuray was designed and constructed to make these tests.

When ordinary iron is heated it expands gradually until a temperature a little above 900 deg. C. is reached. At this critical temperature point the iron suddenly stops increasing in length and actually contracts, a phenomenon which is due to the rearrangement of iron atoms into a new pattern. Below the temperature of change the iron is composed of alpha iron, and after the transformation, gamma iron. When the temperature is increased above this critical point the iron resumes its expansion. Similar changes take place in reverse order when the pure iron is cooled from a high temperature to below its critical point.

Some metallurgists had believed that this change in behavior of iron might be due to impurities, and that if a pure iron were tested this reaction would not occur. Tests of the sample made at Carnegie did not support this theory. The pure sample showed a definite transformation change similar to that of impure iron. But the change was much sharper, having taken place within one deg. C. According to Dr. Wells, this abrupt change is indicative of purity, since each iron atom behaved like its fellows, and was not influenced by impurities which in many cases undoubtedly make the transformation in iron less sharp.

At the present time the metals research laboratory is testing steels of unusually high purity made from this pure iron in order to obtain data on the true constitution of high purity alloys and information on their ability to react. With these data the metallurgist will be able to control the heat treatment of steel and, in turn, determine the capacity of the steel to develop useful properties.

The manuscript presented by B. N. Daniloff concerned itself especially with a preliminary survey of the function of deoxidation as it affects aging of mild steels. In choosing the materials for the determination of this function, a selection was made so as to give as wide a range as possible of deoxidation practice with a resultant wide range in oxygen content of the finished steel. The four classes of materials selected were (1) rimming steel, (2) semi-killed steel, (3) killed steel (with silicon), and killed steel (with aluminum). As wide a range as possible of carbon content was obtained up to 0.25 per cent carbon for these four classes of steels.

The data on these steels are still incomplete, particularly in the low-carbon range. However, Mr. Daniloff's paper was sufficiently elaborate to warrant the following conclusions:

(1) The susceptibility of normalized rimmed steels to quench aging is very high, the maximum being reached in steels containing 0.04 to 0.05 per cent carbon. In the semi-killed steels this aging is considerably less than in the rimmed steels, and the susceptibility to this aging shows a general tendency to diminish with increasing carbon content. The silicon-killed steels quench-age considerably, but only about one-half as much as the rimmed steels.

(2) Steels killed with aluminum quench age very little, the degree decreasing with increasing carbon content. In the carbon range of from 0.12 to 0.25 per cent they become practically non-quench-aging.

(3) The quench hardening of normalized steels decreases with increasing carbon content and with the degree of deoxidation, indicating that both carbon and oxygen are factors determining the aging properties of steel.

(4) Rimmed, semi-killed, and silicon-killed steels are very susceptible to strain aging even in the higher carbon range. Aluminum-killed steels strain age considerably less, the embrittling effect of the strain aging treatment decreasing with the degree of deoxidation. There are indications that the degree of oxidation of steel in the furnace has a considerable bearing on the strain aging of aluminum-killed steels.

(5) Rimmed, semi-killed, and killed steels in the "as-rolled" condition are very susceptible to strain aging. However, the strain aged SMA (see Table

C. H. HERTY, JR., who was the principal speaker at the Metallurgical Advisory Board meeting. Dr. Herty recently left the Carnegie metals laboratory for a position as metallurgist for the Bethlehem Steel Co.

FRANK N. SPELLER, director of the department of metallurgy and research of the National Tube Co. Dr. Speller welcomed the metallurgists to the recent advisory board meeting in Pittsburgh.

F. M. WALTERS, JR., who presented the final report on the constitution of iron-manganese and iron-manganese-carbon alloys. Dr. Walters was formerly with the metals research laboratory, and is now metallurgist for Vanadium Alloys Steel Co.

1; strongly deoxidized with silicomanganese in the furnace and 2 lb. aluminum per ton added in ladle) steels possess a better impact resistance than the other steels investigated.

(6) Some of the steels showed an increase in impact resistance with time after the original drop in resistance. Furthermore, the aluminum-killed steels displayed a marked tendency to soften after quench aging, and it is possible that coalescence of precipitated particles or relief of strain, or both, may have been the cause of these phenomena.

The entire afternoon meeting was devoted to reports on deoxidation, as given by Dr. Herty and formally discussed by members of the steel fraternity. Dr. Herty's first paper dealt with the effect of deoxidation on the impact strength of carbon steels at low temperatures.

The literature on the effect of elevated temperatures on impact strength is voluminous, and during the last four years a great deal of experimental work has been carried out to determine the influence of low temperatures on the impact properties of steel. For many engineering purposes it is important to know the shock resistance of steels at low atmospheric temperatures, and with the ever-developing field of refrigeration and separation of materials at low temperatures, the normal limits of atmospheric temperature have been greatly exceeded in practice. Iron and its alloys in the unnotched condition have a high impact strength at low temperatures, but in practice numerous variations in types of notches result either from design or accidentally through scratches on the surface or because of internal defects. A study of notched bar impact tests is, therefore, highly important to the engineer.

Dr. Herty chose six 0.15 to 0.20 per cent carbon steels and two 0.40 to 0.50 per cent carbon steels for his tests. The complete analyses of these steels are given in Table 1. The six low carbon heats included one rimmed steel (heat R), one silicon-killed steel (heat AX), one semi-killed steel (heat K-7), and three killed steels (SMA-15, 17, and 22). These last three steels were strongly deoxidized in the furnace with silicomanganese and tapped while the bath was perfectly dead. Two pounds of aluminum per ton and a small amount of ferrosilicon were added in the ladle, but no additions were made in the molds. Of the two high carbon heats, SMA-48 was made exactly as described for the three SMA steels above. The silicon-killed high carbon heat, AL, was made by deoxidizing the bath with enough high silicon spiegel to kill the bath dead and the heat was tapped before any action on the bath commenced. Ferrosilicon alone was added in the ladle on this heat.

The specimens were machined to the standard Charpy test with an Izod notch as specified by the A.S.T.M. and the B.E.S.A. The low temperatures were obtained through the use of dry ice.

Dr. Herty presented a great mass of data on all variations of this testing procedure and the results obtained. From these data, the following conclusions could be drawn:

(1) The low temperature impact strength of mild carbon steels increases with decreasing oxygen content of the steel.

(2) The order of resistance to low temperature, 32 to 40 deg. Fahr., embrittlement is as follows:

(a) Thoroughly killed steels containing definite amounts of aluminum in solution.

(b) Semi-killed steels to which aluminum has been added.

(c) Silicon-killed steels.

(d) Rimmed steels.

(3) The best impact results at low temperatures for each steel were obtained by water quenching from 875 deg. C., followed by tempering at 675 deg. C. Excellent low temperature impact properties were obtained by normalizing the mild SMA steels at 875 deg. C.

(4) Overheating had a less injurious effect on the SMA steels than on the other mild steels tested.

(5) Overheating may cause a pronounced drop in impact strength at low temperatures even if no grain growth has occurred. If grain growth does occur, the impact strength at low temperatures is sure to be low. This indicates that changes in solid solubility, or state of suspension of non-metallic elements, upon overheating may change the impact-temperature properties of a given steel.

(6) In the "as-rolled" condition, all the steels except SMA-17 showed poor impact properties at 20 deg. C.

(7) For service at 40 deg. C., the following mild steels would be generally satisfactory:

(CONCLUDED ON PAGE 70)

Editor's Note: This is a series of observations which, strangely enough, are exactly what they purport to be. In other words, they come from the daily diary of a real boss; a prominent executive in the metal-working industry who prefers to remain an anonymous author.

The Boss's Diary

John put me on the spot some six years ago and, all unbeknownst to him, he has had me there ever since.

John came to me and wanted to know what he could study that would put him ahead in our business. John is a good clerk — you can read his writing after it is dry. John is a good employee — he is as punctual as the time clock. John is a good citizen — he has a wife and children, is a good church man and an officer in the local lodge. John in a good neighbor — he calls on you when you are sick and says pleasant and complimentary things. He wanted to get ahead in business and he wanted me to tell him what to study to accomplish that and I'm on the spot.

I might have dealt out the truth in all its brutality and told John that if he studied 'til the crack of doom he'd still be a good clerk whose writing you can read after it's dry, but I learned long ago that truth is too precious to be careless with so I dealt out a small portion and told him the truth about me and said I didn't know and I guess it's just as well that I'm on the spot and that John thinks I'm a dumb sort of Boss.

NEWS OF THE WEEK

January Steel Ingot Output Was 46 Per Cent Above December Total

JANUARY production of open-hearth and Bessemer steel ingots, amounting to 2,834,170 gross tons, was 46 per cent above the December total of 1,941,595 tons. In January, 1934, output was 1,971,187 tons. The American Iron and Steel Institute compiles these figures from the reports of companies which in 1933 accounted for 99.32 per cent of the country's open-hearth steel output and 100 per cent of its Bessemer production.

The daily production rate, however, did not reflect such a marked gain, as there were 27 working days in January and only 25 in December. The average daily output last month was 104,969 tons, engaging the industry's capacity at 47.67 per cent, and an increase of 34 per cent over the 77,664 tons daily made in December when the industry ran at 35.27 per cent. In January, 1934, the same companies operated at 33.16 per cent of capacity and produced 73,007 tons daily.

MONTHLY PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported by Companies Which Made 99.32 Per Cent of Open-Hearth and 100 Per Cent of Bessemer Ingot Production in 1933

1934	Open-Hearth	Bessemer	Calculated Output All Companies Monthly	Calculated Output All Companies Daily	No. of Working Days	Per Cent Operation‡
January	1,786,467	172,489	1,970,979*	72,999*	27	33.15*
February	1,993,638	175,873	2,182,826*	90,951*	24	41.31*
March	2,540,143	202,904	2,760,888*	102,255*	27	46.44*
April	2,622,372	257,482	2,897,529*	115,901*	25	52.64*
May	3,000,624	331,620	3,352,695*	124,174*	27	56.39*
June	2,714,983	282,592	3,015,972	115,999	26	52.68
July	1,343,732	119,869	1,472,584	58,903	25	26.75
August	1,245,445	109,598	1,363,359	50,495	27	22.93
September	1,126,415	117,580	1,251,630	50,065	25	22.74
October	1,325,225	127,789	1,461,932	54,146	27	24.59
November	1,447,297	132,059	1,589,049	67,117	26	27.76
December	1,797,830	131,456	1,941,127	77,645	25	35.26
Total	22,944,171	2,162,311	25,260,570	81,224	311	36.89
1935						
January	2,576,671	239,858	2,834,170	104,969	27	47.67

*Revised.
‡The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1933, of 68,478,813 gross tons for open-hearth and Bessemer steel ingots.

Sheet and Tube Loss Reduced—Hanna Profits

THE Youngstown Sheet & Tube Co. had a loss of $920,152 during the fourth quarter of 1934, after all charges including depreciation and depletion, as compared with a loss of $1,257,371 in the third quarter and a loss of $1,117,121 in the fourth quarter last year. While the report is subject to adjustment on completion of the annual audit, it indicated a loss for the year of somewhat over $2,500,000 after deducting the difference between cost and face value of bonds purchased for retirement as compared with losses of over $8,000,000 in 1933 and $13,000,000 in 1932 before deducting the difference between cost and face value of bonds for retirement.

The M. A. Hanna Co. and subsidiaries had a net profit of $1,726,647 in 1934 after interest, depreciation, depletion, Federal taxes, etc., but exclusive of certain security transactions. This is equal after dividends on 7 per cent cumulative preferred stock to 83c. a share on no par, common stock. In 1933 the Hanna company reported earnings of $1,018,130, or 14c. a share on the common stock.

Elgin Softener Corpn. Takes Over the Isometer

ELGIN SOFTENER CORPN., Elgin, Ill., has taken over a new development in flow meters, known as the Isometer. This instrument which uses a variable orifice principle of operation for the measurement of steam, water, oil and other liquids and gases, was developed by the Isometer Corpn. of Milwaukee. This organization will now be operated as a division of the Elgin Softener Corpn.

Executive offices and manufacturing facilities of the new division will be located at Elgin, Ill. The Isometer division of the Elgin Softener Corpn. will manufacture and sell the meters and the executive personnel of the Isometer Corpn. will be identified with the Elgin Softener Corpn.

Business Improvement Predicted at California Steel Convention

DEL MONTE, CAL., Feb. 9.—Hopes for improvement in steel mill activity are based on more real substance today than at any time during the past five years, according to N. J. Clarke, vice-president of Republic Steel Corpn., Youngstown. In addressing the eleventh annual conference of Iron, Steel and Allied Industries of California Mr. Clarke cited present demands from the automotive industry and farm implement manufacturers and potential demands for modernization of railroad equipment and home building as the basis of his views.

Clyde G. Conley, president of the American Institute of Steel Construction, warned that if the profit system is to be continued in business there must be an equitable division of profits with labor. "Unless business men of this country," he continued, "demonstrate their ability to cooperate jointly for the betterment of social conditions in the United States we can expect even more drastic Governmental inroads into our private affairs than we have ever dreamed of."

The American Steel Warehouse Association was represented by its executive secretary, Walter S. Doxsey, who urged warehousemen to establish themselves as a vital unit of the steel industry and to cooperate with their mills in preserving the stability of their markets.

The relationship of the NRA and codes with the steel industry was discussed by two speakers. Donald Renshaw, newly appointed NRA regional director, outlined the organization and functions of his office and pointed out that the region now had the opportunity to solve its own problems without going to Washington. R. W. Johnson, executive secretary of the reinforcing materials fabricating industry code authority, advocated the retention of "basic code principles," such as fair treatment of labor and open competition, but urged that industry be allowed more freedom in the conduct of its own affairs.

The conference approved a resolution of opposition to various State legislative proposals to "restrict the length of railroad trains, to restrict the number of hours per day or week of railroad labor, and other similar measures which would have the effect of greatly increasing the cost of transportation."

Informal discussion of problems of the different branches of the industry was confined to group meetings which were under the chairmanship of E. Jungquist, Percival Steel & Supply Co.; E. B. McClure, Truscon Steel Co.; L. B. Peeples, Crane Co.; C. P. Hoehn, Enterprise Foundry Co.; and R. M. Alvord, General Electric Co. Upon recommendation of the nominating committee W. W. Glosser, Hubbard & Co., Emeryville, Cal., was elected chairman of the conference with W. H. McGinnis, Union Hardware & Metal Co., Los Angeles, as vice-chairman. Charles S. Knight, California State Chamber of Commerce, was reelected secretary.

Advantages of Steel Code

Mr. Clarke touched briefly on the main commercial advantages which have resulted from the enforcement of the steel code. He stressed particularly the single price policy and the definition of jobber or wholesaler. "While this has led to some abuses by having some classified as jobbers who are not entitled to this privilege," he said, "this is gradually being eliminated as time goes on."

Also of importance in Mr. Clarke's opinion are the elimination of unfair trade practices; extension and clarification of basing points; restriction of new ingot production in view of the fact that it is believed that the present capacity is more than ample to take care of the consumption for some years to come, and emphasis on salesmanship, quality and service, instead of mere "order-taking by the price-cutting methods."

"But," Mr. Clarke went on, "no one can honestly say that the above advantages have been brought about only by the enforcement of the so-called new deal in steel. In my estimation, it is the natural outgrowth of what we were doing yesterday and five years ago, and the new deal in steel, or steel code, merely happens to be the instrument of effect rather than the cause."

Urges Business Cooperation

In urging closer industrial cooperation, Mr. Conley said that "business is not the exclusive right of any individual or group of individuals." "Our Constitution," he continued, "was written to guarantee an equal opportunity to all, and so long as our Government is based upon that declaration of principle not even a political party can ever hope to dictate for long the economic well-being of the American people. If you believe in these constitutional rights, you must also believe in industrial cooperation. You must believe not only in the right but also in the benefits of the trade association.

"The World War demonstrated to our Government the value of a mobilized industry. The general staff of the army is today bending every effort to keep industries and trade organized, at least industries needed in times of war, so that the fighting strength of this nation will never be jeopardized through disorganization, Those who live on the Pacific Coast must appreciate the vital need of this because if war comes again it may be fought within the Pacific area. In that case you will need strong industrial organizations to support our fighting units, and you must therefore not only have your industry here organized, but you will want to have the industry of the country as a whole organized to help you in such an emergency."

Follansbee Ohio Plant To Resume Production

THE trustees of Follansbee Brothers Co. have announced that the Toronto, Ohio, plant of the company, which has been idle for some time, will be placed in operation early in March, after necessary repairs. The plant will produce sheets in the Follansbee Forge qualities.

The opening of the plant will give employment to an additional 500 men at Toronto. The West Virginia plant at Follansbee, W. Va., will continue to operate in the production of tin plate as at present.

Republic to Make "Seal Of Quality" Sheets

THE Republic Steel Corpn. has just signed an agreement to make and sell "Seal of Quality" 2-oz. coated galvanized sheets under the standard license issued by the American Zinc Institute. Companies now participating in the "Seal of Quality" movement represent approximately 85 per cent of the galvanized sheet capacity of the United States.

British Iron and Steel Demand Quiet—Spring Upturn Expected

LONDON, ENGLAND, Feb. 11 (*By Cable*).—Steady specifications for pig iron are coming in but new business is more quiet. Inquiries indicate substantial spring requirements. Exports are going to Scandinavia, Italy, South Africa, Japan, and the Straits Settlements. Heavy deliveries of East Coast hematite are going to the Midlands and Sheffield.

Demand for semi-finished steel is better and the entire output is being absorbed. Few orders are being placed abroad, pending the decision on import duties.

Finished steel orders are in large volume, particularly miscellaneous business, locomotives, rolling stock and shipbuilding. Better export demand includes sheets, and further improvement is expected in the spring. Export demand for tin plates is improving and better inquiry is developing. The home trade is more quiet, and output is at about 50 per cent of capacity.

There is no improvement in the Continental iron and steel market. Merchant steel and plates are comparatively active but all other departments are dull, necessitating output curtailment and stock additions. Chinese demand is affected by a financial crisis. Some small orders have been taken from Japan, Manchukuo and Argentina.

The International Raw Steel Cartel has replied to recent proposals of the British Iron and Steel Federation regarding English membership, but the reply has not been published. A meeting is likely, following pending meetings of the International Wire Makers Association and the tube cartel.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9
Billets, open-hearth	£5 10s. to £5 15s.
Tin plate, per base box	*18s. 2d. to 18s. 9d.
Steel bars, open-hearth	£7 17½s.
Beams, open-hearth	£7 7½s.
Channels, open-hearth	£7 12½s.
Angles, open-hearth	£7 7½s.
Black sheets, No. 24 gage	£9 5s.
Galvanized sheets, No. 24 gage	£11 5s.

*To May 1; 18s. 5d. to 19s. thereafter.

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange

Billets, Thomas.	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Steel bars, merchant	£3 5s.
Sheet bars	£2 8s.
Plate, ¼ in. and up	£4
Plate, 3/16 in. and 5 mm.	£4 2s. 6d.
Sheets, ⅛ in.	£4 7s. 6d.
Beams, Thomas.	£3 2s. 6d.
Angles (Basic).	£3 2s. 6d.
Hoops and strip base	£4 2s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

Kohler Co. Still Under Attack By Defeated A. F. of L. Local

THE aftermath of the Kohler Co. strike is an excellent illustration of organized labor's two-faced attitude toward employee elections. Labor leaders favor elections when favorable to their organizations; they are against elections when they lose them. The employee election held at the Kohler Co. resulted in an overwhelming majority for the company's employee organization. It was immediately contested by the A. F. of L. union and the controversy has been in the hands of the National Labor Relations Board since that time. The board held hearings on the election at Sheboygan, Wis., Jan. 31 and Feb. 1. A public statement of the company's position released by Herbert V. Kohler, executive vice-president, on Jan. 25 follows:

By its rejection of the Kohler Co. proposal worked out last week in collaboration with Federal mediators, Union No. 18,545 apparently indorses the statement its attorney made last September before the National Labor Relations Board to the effect that employment of its members is relatively unimportant—that "the running of the plant is not at all necessary to the welfare of the workers."

Last August, before we resumed operations, we offered to reemploy all of the strikers except those who had engaged in unlawful strike activities, and agreed to impartial determination of the facts respecting the latter. The union committee insisted that union domination of all the workers was more important, and turned down the offer.

Again in November, nearly two months after the election in which Kohler employees overwhelmingly rejected the union as their bargaining agency, we offered reemployment to the strikers on a basis which subsequent developments have proved would have returned a large part of them to work by this time. Again the union committee rejected the proposal, apparently without submitting it to the members for vote. We told them at the time that we needed men and that if they did not take the jobs we would have to hire others.

Since then we have hired several hundred men—not "strike breakers," but respected residents of Sheboygan, Sheboygan Falls, Plymouth, and all parts of the county. They became regular members of the Kohler organization when we needed them, and we will not now turn them out to make room for others. Naturally we are unable at this time to offer as many jobs to the strikers as we could last November before we took the new men on.

In our last proposal, we have offered to hire as many of the strikers as we can by May 1, with a minimum guarantee of 200. That offer expires tomorrow.

Air Conditioning for Hotel Industry

THE hotel industry in America, waging one of the most vigorous "battles against obsolescence" since 1929, will spend upward of $75,000,000 this year for new furnishings and equipment which will bring a large volume of new business to dozens of allied industries and trades, according to Ralph Hitz, president of the National Hotel Management Co.

"Recent surveys indicate that the hotels will spend more than $32,000,000 for new construction materials alone," Mr. Hitz said, "with an additional $2,500,000 for new soundproofing and insulation materials. At least $4,000,000 will go into new kitchen equipment."

The air-conditioning industry, Mr. Hitz declared, stands to benefit directly from a large percentage of the hotels' expenditures for new equipment and modernization this year. "Controlled temperature, particularly during the summer months, is now generally recognized to be absolutely indispensable in the cafes and dining rooms of modern hotels," he said. "A number of the larger hotels installed air-conditioning equipment during 1933 and 1934, with large resultant increases in business."

Steel Corporation Shipments Rose Sharply During January

JANUARY steel shipments by the United States Steel Corpn. rose to 534,055 tons, compared with 418,630 tons in December and with 331,777 tons in January, 1934.

The January movement was sufficient to engage the corporation's finished steel making capacity at 32 per cent, compared with 26.1 per cent in the preceding month.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

				1933		1934		1935	
Month	1930	1931	1932	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity	Shipments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,138	17.7	331,777	19.8	534,055	32.0
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3	.....	...
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6	.....	...
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5	.....	...
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4	.....	...
June	984,739	653,104	324,746	603,937	37.4	985,337	61.2	.....	...
July	946,745	593,900	272,448	701,322	45.1	369,938	23.0	.....	...
August	947,402	573,372	291,688	668,155	39.8	378,023	23.1	.....	...
September	867,282	486,928	316,019	575,161	35.6	370,306	23.0	.....	...
October	784,648	476,032	310,007	572,897	35.5	343,962	20.6	.....	...
November	676,016	435,697	275,594	430,358	26.7	366,119	22.9	.....	...
December	579,098	351,211	227,576	600,639	38.7	418,630	26.1	.....	...
Plus yearly adjustment.	(40,259)	(6,040)	(5,160)	(44,283)	...	.....	...	.....	...
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	*5,925,873	30.8	.....	...

*Before yearly adjustment.

Lake Superior Ore Shipments in 1934 Amounted to 22,063,824 Tons

TOTAL shipments of iron ore from the Lake Superior district in 1934 amounted to 22,063,824 gross tons, according to the annual report of the Lake Superior Iron Ore Association. This compares with 21,672,410 tons in 1933. The all-rail movement was 60,444 tons, against 48,732 tons the previous year. Of the total shipments 66.3 per cent was from the Mesabi Range as compared with 62.1 per cent in 1933. The amount beneficiated was 7,902,467 tons as compared with 6,951,533 tons during the previous year.

There were 122 mines in operation in 1934, the same number as during the previous year. Ore was shipped from 56 Mesabi district mines, a gain of three as compared with the previous year; from 21 Menominee Range mines, a loss of one; from 18 Marquette Range mines, a loss of one; from 14 Gogebic Range mines, a gain of two; from nine Cuyuna Range mines, a loss of three and from four Vermilion Range mines, the same number that were active in the previous year.

The Hartley-Burt mine, as during the previous two years, led in the production of ore, shipping 2,000,942 tons. The Adams Spruce group in the same district replaced the Sellers mine for second position, shipping 1,326,272 tons. However, the Sellers mine shipped 1,170,416 tons, which was somewhat more than during the previous year. These three mines are operated by the United States Steel Corpn.

A new method of beneficiating ore is listed in the report. This consists of producing magnetic concentrates and was employed in an experimental way during the year by the ore firm of Butler Brothers and the Minneapolis School of Mines. The method was used for recovering ore from tailings separated from the ore in a jigging plant.

SHIPMENTS OF LAKE SUPERIOR IRON ORE BY RANGES
(Gross Tons)

Range	To Upper Lake Ports	All-Rail	Total, 1934	Total, 1933
Mesabi	14,649,131	968	14,650,099	13,471,625
Marquette	2,420,464	53,383	2,473,847	2,807,325
Gogebic	2,286,769	362	2,287,131	2,400,932
Menominee	1,330,753	4,274	1,335,027	1,510,985
Vermilion	785,082	67	785,149	740,404
Cuyuna	531,181	1,390	532,571	741,139
Grand Total	22,003,380	[1] 60,444	22,063,824	21,672,410

[1] Includes 679 tons lost in transit.

SHIPMENTS OF BENEFICIATED ORE IN 1934 BY METHODS
(Gross Tons)

Method of Beneficiation	Minnesota	Michigan and Wisconsin	Total
Washed	2,656,315	.....	2,656,315
Jigged	405,605	.....	405,605
Sintered	163,705	.....	163,705
Sinter dried	103,045	.....	103,045
Dried	106,719	.....	106,719
Magnetic	4,652	.....	4,652
Total concentrated	3,440,041	.....	3,440,041
Crushed or screened	2,144,934	2,317,492	4,462,426
Total beneficiated	5,584,975	2,317,492	7,902,467

Industrial Finance

Allis-Chalmers Mfg. Co. had a $1,039,406 preliminary net loss for 1934, compared with $2,893,905 in 1933. During the year just past unfilled orders increased to $8,013,859, compared with $6,425,908 a year earlier. Total orders booked in 1934 amounted to $21,875,009, whereas the total in 1933 was $14,270,940.

American Steel Foundries had a $245,365 consolidated net profit for 1934, the first profit earned by the company since 1930. Operating income in 1934 was $1,168,867, compared with an operating loss of $417,307 in 1933.

Sivyer Steel Casting Co., Milwaukee, earned $2,287 in 1934, after all charges including income tax and provision for Wisconsin unemployment benefits. This is equal to 3c. a share on 80,000 shares of common stock. Net loss in 1933 was $51,261.

Joseph T. Ryerson & Son, Inc., in the year ended Dec. 31, had consolidated net income of $1,380,897 after depreciation, interest and taxes, equal to $3.45 a share on the 400,000 shares of capital stock. In 1933 the company reported $301,489 net income, equal to 75c. a share.

The National Steel Corpn. has declared an extra dividend of 12½c. per common share, in addition to the regular quarterly dividend of 25c. a share, payable on Jan. 31 to stockholders of record on Jan. 21.

A. M. Castle & Co., Chicago, has increased the quarterly dividends on its capital stock from 25c. to 50c. a share. The disbursement is payable Feb. 11 to stock of record Feb. 6. The 25c. rate had been in effect since March 5, 1934.

PERSONALS

GEORGE GORDON CRAWFORD, formerly president of Jones & Laughlin Steel Corpn., Pittsburgh, has severed his connection with the company and will retire to his home at Birmingham, Ala. Since May, 1934, he has been a director and a member of the executive committee of the company, and also had served in an advisory and consulting capacity. Prior to assuming the presidency of the company in February, 1930, Mr. Crawford had been president of the Tennessee Coal, Iron & Railroad Co. He was succeeded as president of the Jones & Laughlin company by SAMUEL E. HACKETT on June 1, 1934.

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CHARLES L. BERGER, president, Eastern Malleable Iron Co., Naugatuck, Conn., has been elected chairman of the board of the company. He has been connected with the Naugatuck foundry for 48 years, in various capacities. LEWIS A. DIBBLE has been elected president, succeeding Mr. Berger.

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WILLIAM L. HARTLEY, heretofore manager of the Detroit office of the Link-Belt Co., has been made manager of foundry equipment sales with headquarters at Chicago. HAROLD L. HOEFMAN, formerly manager of the company's Indianapolis branch, succeeds Mr. Hartley as manager of the Detroit office. RICHARD B. HOLMES, of the St. Louis office, succeeds Mr. Hoefman at Indianapolis, and CARL A. BLOMQUIST, Chicago, succeeds Mr. Holmes at St. Louis, where he will assist HOWARD L. PURDON, manager.

ARTHUR D. MORRIS, since 1927 vice-president of the Bayonne Bolt Corpn., Bayonne, N. J., has been elected president of the company, succeeding ERNEST L. RUPF, who has retired. Mr. Morris started with the company in 1912 as a salesman, became treasurer in 1917, and when the company was merged with the American Bolt Co. in 1923 he was made Eastern manager of sales.

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KURT R. GROENER, during the past eight years identified with the Bennett-Watts-Haywood Co., Chicago, publisher of *Electrical Dealer* and other trade papers, has been appointed managing director of the Porcelain Enamel Institute, 612 North Michigan Avenue, Chicago.

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CHARLES I. WESLEY has been elected vice-president and works manager of the Wesley Steel Treating Co., Milwaukee, to succeed FRANK G. MARKS. He has been secretary since the inception of the firm in 1915. CHARLES WESLEY, SR., has been reelected president and general manager. ARTHUR H. NUESSE, formerly assistant secretary, has been elected secretary, and JOSEPH F. HUSHEK has been reelected treasurer.

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GEORGE C. STONE, who was identified with the New Jersey Zinc Co. from 1882 to 1929, has been awarded the James Douglas medal for "distinguished achievement in the field of non-ferrous metallurgy." The William Lawrence Saunders medal, which is given for "distinguished achievement in mining," has been awarded to JAMES MACNAUGHTON. He is president and general manager of the Calumet & Hecla Consolidated Copper Co. and past-president of the Lake Superior Mining Institute. Francis M. Rich, who is connected with the Republic Steel Corpn., Youngstown, has been granted the J. E. Johnson, Jr., award, which is given annually to "engineers under 35 years of age who have distinguished themselves in iron and steel work."

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H. C. GUILD has been made manager of the Eastern regional division of the Vilter Mfg. Co., Milwaukee, manufacturer of refrigerating, air conditioning machinery and of steam engines. The company has arranged to build many of Mr. Guild's apparatus upon which there have been patents issued or pending. Mr. Guild was formerly identified with the A. M. Byers Co., Pittsburgh.

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JOHN A. CHESNEY has been made a member of the board of administrators of the unemployment plan of the General Electric Co., Pittsfield, Mass.

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JOHN A. ROBINSON, formerly in charge of the Dallas, Tex., office of the Timken Roller Bearing Co., has been transferred to the automotive division and appointed district manager of that division with headquarters at the Chicago office, 2534 South Michigan Avenue. H. W. TRUMP has been promoted to the position of district manager of the industrial division of the company, with headquarters at 409 Olive Street, Dallas, Tex.

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D. L. ORTON, heretofore sales engineer with the Clark Controller Co., Cleveland, has been transferred to the Chicago district office as sales and engineering representative.

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IRVING M. SMITH, heretofore manager of floor plate sales for the Central Iron & Steel Co., Harrisburg, Pa., has been appointed assistant general sales manager. Before his connection with the Central company, he was employed for a number of years by Alan Wood Steel Co., Conshohocken, Pa.

LEFT

WALTER E. HADLEY, new general superintendent, Gary works, Illinois Steel Co., whose appointment to that post was announced in these columns Jan. 31.

RIGHT

WILLIAM P. GLEASON, who, as announced in the issue of Jan. 31, retired on Feb. 12 as general superintendent, Gary works, Illinois Steel Co.

The Babcock & Wilcox Co., New York, has made 25 per cent reduction in the price of the B&W Junior firebrick. The new price is $90 per thousand, in carload lots, f.o.b. Augusta, Ga.

Flying Yankee, New Stainless Steel Train, Makes Trial Run

THE new Flying Yankee stainless steel, Diesel-motored streamlined train built by the Edward G. Budd Mfg. Co., Philadelphia, for the Boston & Maine and the Maine Central railroads, and the first train of its type to be delivered to an eastern line, was tested Feb. 5 at speeds up to 100 miles an hour over the tracks of the Reading Co., between the Budd plant and West Trenton, N. J.

Officials on the trial trip included J. W. Rimmer and H. W. Munster, vice-presidents of the Boston & Maine and Maine Central railroads; Col. E. J. W. Ragsdale, chief research engineer of the Budd company; G. W. Codrington, president, Winton Engine Co.; and F. C. Horner and Harley Earl, General Motors Corpn.

After an exhibition tour and test runs in New England, the train will be placed in service between Boston and Portland and Bangor, Me. Plans call for a daily run from Portland to Boston, a round trip from Boston to Portland, a daily mileage of nearly 700 miles.

The train, an articulated unit, consists of three car bodies carried on four trucks. It is 199 ft. 2¾ in. long and is estimated to weigh 212,000 lb., including power plant, which accounts for half the weight. The weight of one sleeping car such as used on limited trains is about 200,000 lb.

Seats are provided for 144 passengers. The forward section in addition to carrying the engine, compressor and other mechanical equipment, has an 11-ft. 5-in. baggage compartment, a 6-ft. 5-in. buffet, and space for 28 passengers. The middle section has two compartments seating 24 and 36 passengers respectively, while the rear section has a compartment with seats for 36 passengers and an observation lounge with 20 armchairs.

The exterior of the cars are sheathed with stainless steel sheets, providing a smooth silvery surface that offers little resistance to the wind and effectively reflects the heat of the sun. The outside surface of the train is preserved unbroken by the use of flexible diaphragms that are compressed or extended like an accordion, by doorsteps that fold up when the train is in motion and by windows that are flush with the sides.

The train is air conditioned by Frigidaire mechanical equipment

THE Flying Yankee, built by the Edward G. Budd Mfg. Co., for the Boston & Maine and the Maine Central Railroads, is the first stainless steel, Diesel-motored streamlined train delivered to any Eastern line. It is a three-section articulated unit, the rear section of which includes the observation lounge pictured above. Smooth riding even at high speed, and quick acceleration and deceleration are noteworthy.

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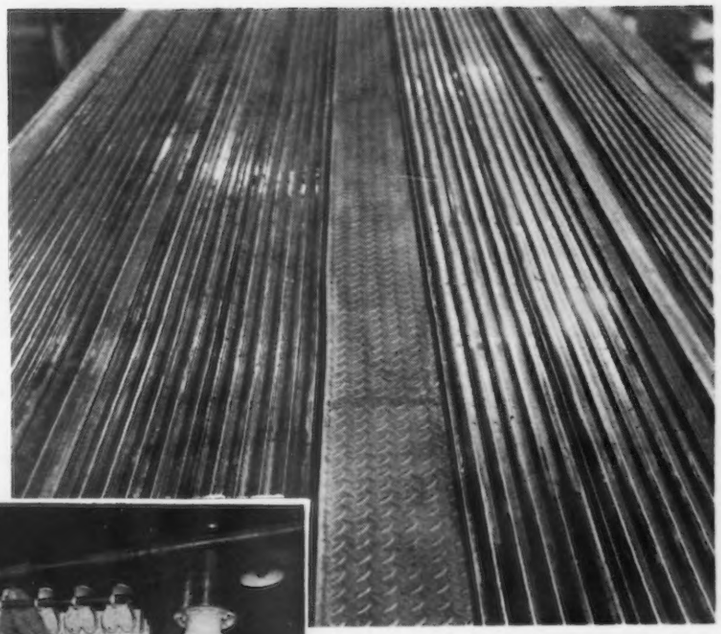
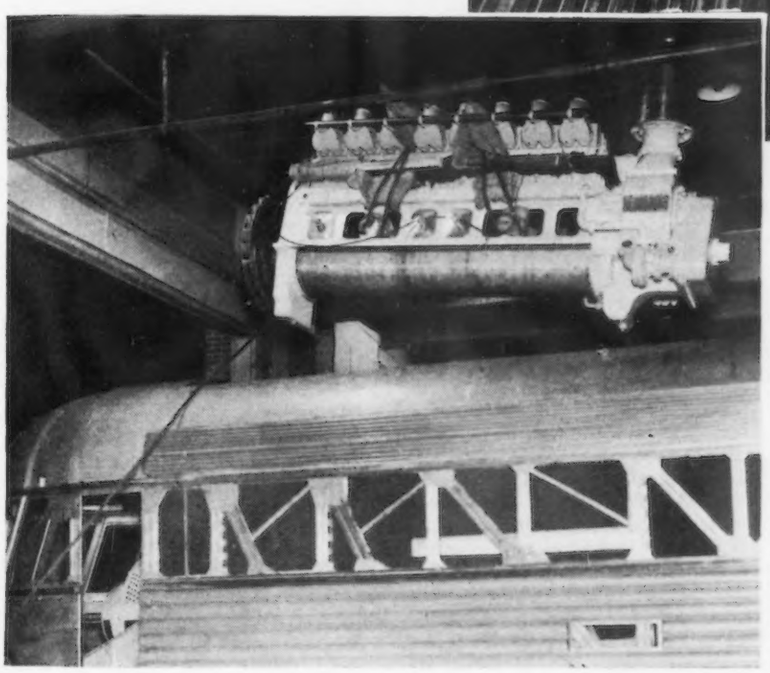
and is thoroughly insulated against both heat and sound. Rubber insulation has been used extensively in the trucks to prevent the transmission of sound and vibration to the car bodies. Lighting in the passenger compartments is indirect; that of the lounge is direct, through diffusing glass. Interiors, designed in cooperation with the Art and Color section of the General Motors Corpn., are furnished in pleasing color schemes, and in the seating, as well as other details, careful attention has been given to maximum travel comfort. Seats in the passenger compartments have tubular aluminum frames.

Smooth riding even at high speeds, and quick acceleration and deceleration are noteworthy.





LOWERING of the Flying Yankee's 600-hp. two-cycle Winton Diesel engine into place in the forward section is pictured at the left. Engine weight has been reduced to 22 lb. per hp. by use of a welded steel plate to form a one-piece engine block. The cat walks shown above are of extremely light gage on "AW" Super-Diamond pattern floor plate supplied by the Alan Wood Steel Co.

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Construction Similar to Zephyr

In design and construction this new stainless steel streamlined train is very similar to the Burlington Zephyr described in THE IRON AGE of Aug. 9, 1934. The characteristic truss form construction adapted by the Budd company for the utilization of built-up sections of thin gage stainless steel is employed. Main members of the car bodies are Pratt truss side frames carried up to the roof by the use of diagonals in the wide deadlights between the windows and the roof, which forms the top chord. The truss members are for the most part flanged sections formed of deep flanged channels and cover plates joined by shot welding.

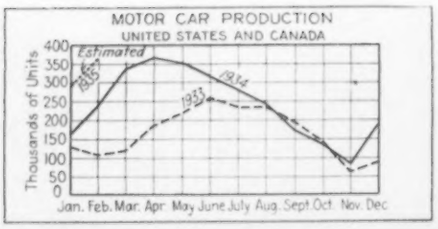
The floor structure, and the roof, which constitutes a primary structural member assuming the entire compression load, are for the most part the same as in the previous stainless steel train. Likewise the welded steel plate engine bed, fabricated by Lukenweld, Inc., is designed to serve as a combination bumper, engine bed and bolster, but is somewhat longer and a little heavier than the previous unit. It is made of Cromansil, an alloy of chromium, manganese and silicon having a tensile strength of 90,000 lb. per sq. in. and elastic limit of 70,000 lb. and high resistance to fatigue and shock. The complete structure, weighing 6813 lb., is built into the lower chord member of the side trusses and forms the foundation for the nose structure of the car.

The power plant for driving the train includes a 600-hp. high-compression, two-cycle, eight-in-line Diesel engine built by the Winton Engine Corpn., division of the General Motors Corpn., and a main generator, exciter, and auxiliary generator built by the General Electric Co., which also supplied the traction motors. A 75 cu. ft. per min. Gardner Denver air compressor is driven mechanically directly from the rear of the engine crankshaft.

Engine weight has been reduced to 22 lb. per hp. by the use of arc-welded steel plate to form a single-piece engine block, comprising the crankcase and cylinder block, to which a light oil pan is attached. A nine-bearing crankshaft is carried on main bearing seats fastened to the end of individual cross members cut to form frames for the fabricated engine block. In this manner combustion stresses are transmitted directly to the bearing seats, through the solid frames held rigid by the various patterns of welded plate.

Water jacketed cylinder liners of heat-treated cast iron are bolted to the cylinder heads, which in turn are fastened in the usual man-

(CONCLUDED ON PAGE 72)



THIS WEEK ON THE A

Production Curve Continues to Ascend As A. F. of L. Plans Strikes

DETROIT, Feb. 12.

THERE are still some people who think that the automotive production train, having proceeded for the last six weeks at express speed, is due shortly to strike an open switch and abruptly end its giddy journey. If it is shunted unexpectedly onto a siding, it will be because of the machinations of leaders of the American Federation of Labor, who apparently are planning to do what they can near the end of the month to bring about a walkout in certain plants.

Leaving aside the labor angle for a moment, one can find no other plausible explanation for the present high operating rate in the industry than a healthy retail demand for cars. It looks as though one motor car executive may be right in his statement that "we are at the beginning of a real buying wave, not a mere ripple." Facts and figures substantiate the claim that the public is doing more than looking at new models. They are buying them.

Ford made domestic retail deliveries of 75,678 cars and trucks in January, General Motors 54,105, Plymouth about 24,000 and Dodge almost 12,000. With these figures used as the basis for an estimate, it appears that at least 185,000 cars and trucks were delivered to customers in the United States last month. Production in the United States and Canada in January amounted to 306,000 units, according to the Automobile Manufacturers' Association. After allowance is made for Canadian sales and for export shipments, one deduces that, even with the heavy output by factories, well over 60 per cent of the cars went into consumers' hands and dealers were able to retain for demonstration, display and stock, an average of only three cars each.

Ford Sales Are High

Here is pleasant reading for those searching for cheerful signs. From the standpoint of production, last month was the fourth best January on record and the biggest in six years. Retails sales were the highest in five years. Ford built 105,230 units, of which 91,043 were made in this country. In the ratio of retail sales to factory output, Ford's showing was far ahead of the industry's. It delivered to customers 75,678 units, or 82 per cent of its domestic assemblies, as against 55 per cent for General Motors. In other words, Ford dealers on Feb. 1 had on hand only 15,365 units out of the 91,043 cars received during January.

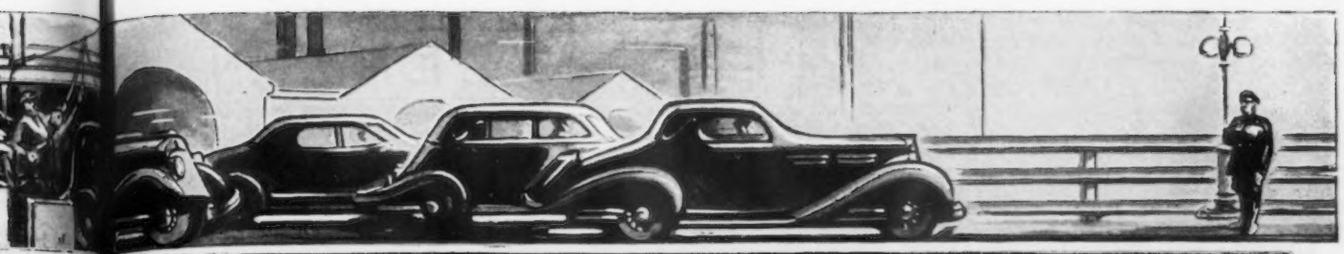
Chevrolet has been doing some belated crowing about having come out on top in passenger car sales in 1934,. but in the current Ford-Chevrolet sales tussle the former seems to have all the best of it. It is believed that when the final count for January is completed, Ford will be in the lead by a margin of 30,000 to 35,000 units (combined passenger car and truck sales). And any veteran motor car executive will tell you that that is quite some handicap for Chevrolet to overcome. Incidentally, the margin in Ford's favor is larger than it was a year ago, when Chevrolet was delayed in getting started.

The mystery in Detroit is what has been holding back Chevrolet. It has been almost impossible to secure delivery of Master models, and it is understood that early last week Fisher turned out the first coupe bodies for the Master series. The explanation most often heard is that a hold-up occurred in obtaining bodies, probably because the smoothing out of production of turret tops has not been accomplished as rapidly as anticipated. At any rate, Chevrolet officials are maintaining an eloquent silence, while inability to get cars off assembly lines puts the company in almost the same uncomfortable spot occupied a year ago.

Chevrolet Schedules 80,000 Units

Chevrolet's February schedule now specifies approximately 33,000 Master models, 28,000 Standard and 19,000 commercial cars and trucks. This is a total of 80,000 units. The local gear and axle and forge plants are producing about 4000 units a day. This month they also will build 18,000 rear axle assemblies for Pontiac.

Last month Plymouth shipped 48,696 cars to dealers. At present the factory is building about 2000 cars a day. Dealers' orders placed since introduction of 1935 models total 125,000 cars. Dodge dealers report retail deliveries of 16,350 passenger cars (about equally divided between Plymouth and Dodge) and 3404 trucks during January. Graham-Paige has made 2600 cars this year and has on hand 3900 unfilled orders. Having reduced Airflow list prices almost to 1934 levels, De Soto and Chrysler are said to be pushing production on both the Airflow and Airstream series, with the latter outstripping the former in sales by a wide margin.



THE ASSEMBLY LINE

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

Hudson-Terraplane is understood to be operating only four days a week. Studebaker has resumed assembly activities following a short shutdown, according to reliable advices. Hupmobile, still in the throes of reorganization, appears to be running at a relatively light rate. After a tenure of office lasting several weeks, William J. McAneeny has resigned as president and general manager. New members of Hupp's board are Emlen S. Hare and Frank F. Beall, both of whom at one time were high Packard officials. Hupp is now making its own camshafts at its Fostoria, Ohio, plant. Reo has recently started a second assembly line in its truck factory at Lansing, one for light trucks and the other for heavy units.

Retail Sales Better Distributed

One of the most encouraging developments is the better distribution of retail sales among all price groups. This doesn't mean that the quality market has suddenly come back or is likely to this year, but it is significant that Cadillac-LaSalle has had sufficiently good business to warrant advancing its schedules two weeks. Buick has been doing better than in the early weeks of 1934. Pontiac and Oldsmobile are putting on the pressure to get 18,000 and 15,000 cars respectively this month. The first Packard 120 came off the assembly line today.

Unless serious labor disturbances should disrupt the industry's plans, production this month should range from 360,000 to 380,000, and in March should soar above the 400,000 figure. April should surpass March and probably will be the peak month of the year. May and June, however, should be good months. What then of future steel demand? First signs that Ford is emerging from a period of frenzied steel buying appeared the past week when some mills received instructions to hold back shipments of sheets. At the same time that Ford has been turning out cars at a record-breaking pace it seemingly has been purchasing even more steel than it currently needed. It is whispered on good authority that it has sheets stored in its idle glass plant as well as in other convenient spots at Rouge and has enough steel for front truck fenders to take care of requirements for the next 90 days.

Ford Storing Steel

Whether Ford feared possible labor trouble in steel mills or simply wanted to be sure that it had comfortable stocks at a time when every automotive steel user is crowding mills for deliveries, the fact remains that it has bought in excess of present needs and hence the peak of its steel volume has passed. This should not be taken as a forecast of wholesale hold-up orders from Ford or of a sudden deflation of business from Dearborn, for Ford will continue a heavy purchaser of steel for at least another 60 days. It is evident, however, that the almost breath-taking demand for steel is easing, and from now on Ford's buying will be in less spectacular volume.

Chevrolet is expected to increase its steel releases as the Ford buying wave slowly recedes. Chevrolet probably won't strike its stride until March, and steel men are anticipating large orders at Flint and Detroit in the immediate future. Chrysler is likely to continue to take in steel at about the present rate for some weeks ahead. General Motors units, such as Buick, Pontiac and Olds as well as Fisher Body, are believed to have only modest stocks of steel and, therefore, should be active buyers well into the second quarter. At this vantage point one can see slight indication of any general letdown in automotive steel releases until at least some time in April.

As to a possible hitch in production due to labor trouble, the course of the American Federation of Labor has become more clearly defined. President Green is to make a speaking tour of automotive cities beginning Feb. 17 and ending in Detroit on Feb. 23. During his stay in this city the national council of federal automotive unions will meet and recommend to the locals that demands for "better working conditions" be made on their managements. The plan, it is understood, is for locals in key plants, supplying parts to large automobile companies, to present their lists of complaints simultaneously and precipitate a strike. Then if they can draw out enough men to make their strike effective they are hoping that the President will intervene because of his interest in keeping the industrial recovery machine in southern Michigan functioning. As part of its price for peace, the Federation would demand abolition of the present Automobile Labor Board and creation of a new industrial relations board for the automotive parts as well as the automobile manufacturing trade. Such a board would be comprised of neutral members in contrast to the present set-up of representatives of management, labor and the public.

Car manufacturers privately predict that the Federation is not strong enough today to bring another crisis on the entire industry as it did last March. As proof they point to the handful of workers who designated preference for the Federation in recent plant elections. The Federation, on the other hand, says that the companies underestimate its strength and the latter are due for a surprise. Experienced observers lean to the opinion that the Federation's proposed tactics are born of desperation because of its failure to penetrate the industry.

THIS WEEK IN WASHINGTON

Massachusetts solon asks for 30-hr. week and tax on labor-saving machinery in week's prize anomaly.

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Labor's latest moves in steel industry point to extinction of Amalgamated association.

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Department of Justice strikes severe blow at business confidence in seeking to prevent Republic-Corrigan, McKinney merger.

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Proposed reduction in duty on manganese ore from Brazil steps on many important toes.

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NRA report on automotive labor conditions attempts to embarass key recovery industry.

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BY L. W. MOFFETT

Resident Washington Editor, The Iron Age

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WASHINGTON, Feb. 12.—Prize anomaly: Chairman Connery of the House Committee on Labor demanding a tax on labor-saving machinery and at the same time asking for the 30-hr. week. . . . Even Mr. Connery recognized the inconsistency. . . . For he agreed that "some employers might try to install more machinery to reduce the size of payrolls on which the tax for unemployment insurance is to be levied." . . . Mr. Connery's quaint idea is to prevent employers from beating the payroll tax and was meant as a reply to the contention of the National Association of Manufacturers that the 3 per cent payroll tax carried in the security bill would tend to encourage installation of more labor-saving devices.

Which recalls the observation of a real economist, sans Brain Trust delusions, that the United States is now well into an "era of defensive recovery." . . . Barring things now unseen, he thinks the upturn will be "most substantial" by the end of the present year. . . . Neither on account of nor in spite of the New Deal. . . . Rather because industry is being compelled to turn to modern equipment to hold down costs, the steel industry to new continuous sheet and strip mills, the automotive industry to the latest technological improvements, etc., as a means of defense against hard-pressed competition. . . . It will be a "break" for the New Deal campaign next year, possibly. . . . For with recovery here, whether New Deal inspired or delayed by New Deal experimentation, the New Deal would be hard to beat. . . . But without actual recovery as contrasted to dole-subsidized recovery, the New Dealers realize they may get a lively trouncing if faced with any sort of worthy foe.

The People's Lobby at a meeting in Washington last week gravely went on record in favor of "socialization" of the steel, aluminum and textile industries, as though industry had not already been socialized rather solidly from Alpha to Omega. . . . "Policies of price maintenance followed by steel and other industries are largely responsible for the continuance of the depression," owlishly observed Horace E. Davis, one of the lobbyists. . . . Apparently Mr. Davis suffered a mental lapse or does not take seriously the new phrase "since the depression." . . . Also Mr. Davis must not have read of the industry's welfare work or the more or less complicated steel code. Mr. Davis declared, with striking originality, that the "steel barons" have exploited their laborers, worked them excessively long hours at an excessively rapid pace, paid virtually no attention to the prevention of occupational diseases and prevented union organization by illegal and immoral efforts. This blast together with A. F. of L. agitation to organize the industry and the Department of Justice

suits against important units of the industry formed a simultaneous three-front assault on steel at Washington last week. . . . There is nothing like restoring confidence to bring about recovery.

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Is the Amalgamated Doomed?

Is the one-time aristocrat of union labor doomed? Gone is the Amalgamated Association of Iron, Steel and Tin Workers as an organization of highly skilled craftsmen, intellectually equipped to negotiate reasonably with manufacturers under the capable leadership of the veteran M. F. Tighe. Now gone vertical, its heterogeneous ranks broken into warring factions, fire-eating radicals are demanding the scalp of Mr. Tighe, who knows more about the technique and problems of the industry than the entire group of the left wingers will ever know.

Nor do they care to know. Agitation is the life-blood of their self-seeking objective, and understanding and reason are mere by words that are scorned. Becoming no more than an obscure appendage of the American Federation of Labor, with little or no voice, the Amalgamated's complete extinction is now threatened.

Mr. Tighe's grasp on the reins has become insecure as might have been expected after the association lost its former identity as a craft organization and was converted into a vertical union partially swallowed by the A. F. of L. Now the move is to complete the swallowing. The plan is to organize the steel workers into "federal" unions, each with a local charter. President William Green of the A. F. of L., himself caught between the Scylla of moderation with which even Mr. Tighe has been forced to compromise, and the Charybdis of radicalism, hardly knows which hand to play. He is forced to wobble just as Mr. Gompers had to wobble when the Foster note of communism was at its crescendo in the 1919 steel disturbance.

Mr. Green, of course, has a "mandate" from the A. F. of L. San Francisco convention to organize the steel industry "industrially," which supposedly means bringing all of its workers into one great A. F. of L. union. The idea is to cast aside the Amalgamated as an outmoded garment, give the opportunity of merging, without identity with the one big union under the "federals."

The Amalgamated stands convicted by the radicals of having failed in its job of organizing the steel industry and of being entirely too unaggressive. Now William J. Spang, a rank and filer of the dissension-torn Amalgamated, has come to Washington to "demand" that the executive council of the A. F. of L. get busy, send organizers into the industry, raise cain generally and put it under the canopy of one big union. Then the manufacturers, so the radicals shout, will meet their demands, or else—

Brave words meant for the rank and filers and words often heard before. Mr. Green, high priest of conservatism when wrestling with turmoil within the federation ranks, has said he "would consider a proposal that the A. F. of L. send organizers into the steel towns and enroll the steel workers into federal unions." The relationship between the federal unions and the Amalgamated, he added, would have to be worked out later, "if the federal union plan were adopted." His caution was well taken for the plan has not been adopted. Moreover, the Amalgamated's rank and filers have aroused the anger of the stormy John L. Lewis, United Mine Workers' head, because of "rump" meetings they have held with mine workers who jumped over the United Mine Workers' traces. So Mr. Spang may have to face the mighty Lewis and give account of himself or else. Not that Mr. Lewis "loves" the steel industry less, but he hates "rumps" more. In any event it looks at this moment as though the Amalgamated's star had set.

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Proposed Pipe Line May Take 200,000 Tons of Steel

The proposed 1000-mile gas pipe line stretching from the Texas Panhandle to Detroit by way of St. Louis is estimated to require 200,000 tons of steel or iron pipe, if a 24-in. line is laid. The project, however, is merely in the stage of preliminary discussion and if it actually becomes a definite undertaking it will be in the rather distant future. The informal plan was discussed recently by R. B. Anderson, representative of the Governor of Texas, with Harold L. Ickes, Public Works Administrator, looking to a loan and grant of $50,000,000 from the PWA.

The tentative proposal is to set up a self-liquidating authority to proceed with the project. It is not clear whether the authority would be set up by Texas alone in connection with other States through which the line would pass. Apparently enabling acts would have to be passed by the various State legislatures to proceed with application for the line and its construction. This, however, is not certain. It is a new proposal unlike any heretofore coming before the PWA.

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Oliver Twist Request Held Up

Organized labor's demand for more representation on the National Industrial Recovery Board has been held up. Labor says its only representative on the board is Sidney Hillman, Lithuanian-born, well known Socialist, head of the textile union and easily one of the smartest labor leaders in the country. They contend industry has two representatives, Chairman S. Clay Williams and A. D. Whiteside. The fact remains that labor has had altogether sympathetic treatment at the hands of such board members as Dr. Leon C. Marshall, highly educated economist, formerly associated with the Brookings Institution and Johns Hopkins University, and Prof. Walton H. Hamilton, both of whom voted with Hillman on the auto code and other major issues.

Organized labor's efforts for still more representation on the board was made through the NRA Labor Advisory Board, supported by Secretary of Labor Perkins. President William Green of the American Federation of Labor is a member of the advisory board. The Administration is reported to have withheld action on the demand because it would upset the present "balance" on the board.

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Yankee Traders Call Off Swap Plans

Yankee Traders, Inc., has suffered some severe setbacks in its dreams of greatly expanding world markets. The latest bubbles to burst were an imagined tremendous trade in metal-working machinery, cotton, etc., with Soviet Russia and cotton with Germany. Secretary of State Cordell Hull is prime promoter of the corporation, but he was not in accord with the German deal. One may disagree cordially with tariff views of Mr. Hull. But one gladly pays tribute to him as a man of courage and who is prepared to act when he becomes aroused. And aroused he became with Russia's diplomatic jockeying and its more or less presumptuous demand that the United States "lend" it $100,000,000 before it would proceed further with debt negotiations.

It seems that Russia stood ready to pay the United States $1 on account if the United States "loaned" Russia $2. Preposterous, thought Mr. Hull. So-called diplomatic relations were not broken off but

plans to proceed with trade negotiations with Russia are off. The Import-Export bank plan to support an enormous American export trade has gone a-glimmering.

At the same time the fatal blow was given the Import-Export bank plan to negotiate a barter pact with Germany. The idea was that the United States would send 500,000 bales of American cotton to Germany. Germany was to remit 25 per cent in cash. The remainder was to be paid in goods. In calling off the deal, President Roosevelt indicated that the pact would have meant dumping of German goods into the American market, but it is said the plan really was blocked by Secretary Hull who is against the barter plan. It is strongly favored by George N. Peek, the President's adviser on export trade. Secretary Hull vigorously supports reciprocity and is said to have objected to the German plan both because of its principle and difficulties over German debt payments to American citizens.

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President Stands by Aids

Organized labor took the count in its bitter attacks last week on Donald R. Richberg and S. Clay Williams. Both were given a resounding Presidential approval. The New Deal coordinator was defended by direct inference when the President replied sharply to the attack made on the Automobile Labor Board by Charlton Ogburn, counsel for the Automotive Workers Council, the Association of Iron, Steel and Tin Workers, etc. The attack was made in a letter written to the President by Mr. Ogburn and was written in the same caustic tone that has been reflected in attacks made by American Federation of Labor officials.

The President made it distinctly clear that the ALB is not a mere arbitration board, subject to dissolution at any moment, as Mr. Ogburn implied, but is a Government organization set up to see that employer and employee alike get a fair deal in bargaining collectively. Efforts to oust Mr. Williams from the NIRB met with a sharp rejoinder from the President that Mr. Williams was chosen because of his qualifications. So instead of Mr. Richberg and Mr. Williams being on uneasy official seats, they are more firmly entrenched than ever.

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Better Brazilian Market Seen for Steel Furniture and Automobiles

The Brazilian reciprocal tariff agreement provides for a reduction of 50 per cent in the Brazilian duty on steel furniture from the United States. Possibilities of building up exports is seen from the fact that value of steel furniture shipped to Brazil in 1929 was $269,000, while in 1933 it dropped abruptly to $69,000. Exports of automobiles and trucks, buses, etc., on which the duty was cut 20 per cent, aggregated $24,251,000 in 1929 compared with $3,150,000 in 1933, passenger car exports in the two years being $16,229,000 and $2,044,000, respectively. Brazil ranked tenth as the source of automobile exports last year, and ranked second as the chief Latin-American market, being exceeded only by Argentina.

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Putting NRA on High Seas

In order to keep the American merchant marine afloat the United States Shipping Board Bureau of the Department of Commerce has made recommendations looking to the elimination of unfair trade practices by certain rate-slashing foreign steamship lines.

A la NRA, the board condemns two practices which are held to threaten the American merchant marine. It would bar rate cutting itself and the use of rate cutting as a club to compel other carriers to adopt pooling agreements, etc. Rate cutting is indulged in by so-called non-conference lines. The American shipping interests were supported in their protests against rate cutting by over 70 foreign flag carriers.

The investigation conducted by the bureau has brought forth a concise, clear report to be made to Secretary of Commerce Roper for his approval after an opportunity has been given for the filing of comments or exceptions to the report. Conference rates themselves sagged sharply in 1933, even under the preceding year of depression, but when they were reduced the non-conference lines made further cuts, generally ranging from 10 to 25 per cent.

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Low Cost Housing in Boston

The PWA has started condemnation action against a site for a low-rent housing project for Boston and has allotted $5,000,000 for the development. According to tentative plans, the Boston project will provide good metropolitan homes for approximately 960 families at modest rentals. It will cover slightly more than 19 acres and will consist of an apartment row-house type development. The project overlooks Old Harbor and faces Columbus Park. Administrator Ickes has said that everything possible will be done to assist owners of the proposed site to sell their land to the Government, sales to be paid for in cash.

Split Widens in Steel Union Ranks

"RUMP" meetings of some 600 representatives of steel workers and coal miners held at Rankin, Pa., on Feb. 2 and in Pittsburgh on Feb. 3 widened the breach between "rank and filers" and recognized union authorities.

The Amalgamated Association of Iron, Steel and Tin Workers, which was under attack by the steel worker delegation, promptly retaliated by revoking the charters of lodges which had sent delegates to the meetings.

At first it was thought that this move had the blessing of American Federation of Labor headquarters but a subsequent trip to Washington by William Spang, leader of the rump conventions, has raised doubts as to ultimate A. F. of L. policy. It is known that national union leaders have been dissatisfied with the alleged "unaggressive" direction of the Amalgamated association, but they cannot give their unqualified approval to the new group without antagonizing powerful John L. Lewis, head of the United Mine Workers, whose organization also came under attack in the Pittsburgh district meetings.

Malleable and Steel Castings Production

WASHINGTON, Feb. 12.—Production of malleable castings in December rose to 32,746 tons from 28,515 tons in November, while for the year 1934 it went to 369,458 tons from 268,638 tons in 1933, according to the Bureau of the Census. Shipments in December increased to 29,593 tons from 28,530 tons in November, while for last year they aggregated 357,127 tons, compared with 256,373 in the preceding year. Bookings last December were 36,505 tons against 28,530 tons in November and for the year they were 354,146 tons, compared with 257,997 tons in 1933.

Orders for commercial steel castings totaled 434,131 tons in 1934 as against 280,231 tons in 1933, according to the bureau. Output for the two years aggregated 450,087 tons and 277,678 tons respectively.

Department of Justice Files Suit To Prevent Republic Steel Merger

WASHINGTON, Feb. 12.—While the New Deal through the NRA has sought cooperation between the Government and industry and within industry to bring about stabilization and recovery, the Department of Justice has instituted proceedings against the steel industry. Simultaneously, another Government adjunct, the Federal Trade Commission, has inspired legislation to abolish holding corporations in the field of public utilities, said by some to be a forerunner to a general onslaught against holding companies.

The entire steel industry was taken by surprise at the action of the Department of Justice last Thursday when it filed anti-trust proceedings in the United States District Court in Cleveland, to prevent the Republic-Corrigan, McKinney merger and to break up interlocking directorates in steel companies. Both suits were instituted under the Clayton act and were filed by Walter L. Rice, special assistant to the Attorney General.

The proceedings against the Republic Steel Corpn., and the Corrigan-McKinney Steel Co., and the latter's subsidiaries was brought under Section 7 of the act, and, in seeking an injunction to restrain the merger, it is charged that the effect of the stock acquisitions will be to lessen substantially competition between the companies affected.

The other suit was brought under Section 8 against 17 defendants and charges that seven individuals have interlocking directorships among 10 competing steel companies. The companies are the Youngstown Sheet & Tube Co., Inland Steel Co., Wheeling Steel Corpn., Otis Steel Co., Delaware River Steel Co., Republic Steel Corpn., Corrigan-McKinney Steel Co., McKinney Steel Holding Co., Cleveland-Cliffs Iron Co. and the Cliffs Corpn. The interlocking directors who are named as defendants are William G. Mather, S. Livingston Mather, D. T. Croxton, Cyrus S. Eaton, George T. Bishop, William R. Burwell and Myron A. Wick. Each is alleged to be a director of two or more of the 10 named corporations, which are said to have assets aggregating approximately $900,000,000.

Basis of Suit

In the suit against the Republic-Corrigan, McKinney merger, it is stated that the Republic Steel Corpn. will acquire all of the assets of the Corrigan-McKinney Steel Co., including approximately 80 per cent of the stock of the Newton Steel Co., and virtually 100 per cent of the stock of the N. & G. Taylor Co., now held by the Corrigan-McKinney company. The latter, the petition stated, will acquire at least 17½ per cent of the common stock of Republic in addition to other Republic securities.

The petition charges that under the terms of the merger agreement, Corrigan-McKinney will dissolve within 30 days and will distribute the Republic's stock and other securities to its stockholders, including the McKinney Steel Holding Co.

Both Republic and Corrigan-McKinney are described as integrated steel companies, engaged in the production of iron ore, pig iron, semi-finished steel and finished steel. Republic, the petition stated, has assets of approximately $271,-

Must the Federal Trade Commission Justify Its Existence?

BEHIND the court injunction sought by the Department of Justice to block the proposed merger of the Republic Steel Corpn. and the Corrigan, McKinney Steel Co., the shadow of the Federal Trade Commission is discernible. The record of the commission in suits of this kind is not particularly impressive. Many persons had come to believe that that bureaucratic body was doomed to a speedy end with the enactment of the National Industrial Recovery Act, but it has put up a strong fight for survival. The present action is cleverly timed to attract public attention during the session of a particularly radical Congress.

THE merits of the suit to prevent the merger, as well as the action attacking interlocking directorates, will undoubtedly be thoroughly covered in court. Unfortunately, the way in which this move of the Federal Trade Commission fits into the general scheme of industrial recovery will probably be ignored.

CONSUMMATION of the merger would mean the largest and most important piece of industrial financing since recovery began. The entire plan bespeaks the faith of the stockholders and directors of the two companies in the future of the steel industry. It is admitted even in the highest Administration circles that business confidence is very badly needed at this time. Is the trade commission anxious to help?

THE proposed merger has been publicized and discussed more than any previous consolidation in the iron and steel industry. The small stockholder held the key to the success of the undertaking and the companies' managements have told him all he could possibly want to know. Only last week, after six months' work, the announcement was made that the necessary amount of stock to assure the merger would be voted in its favor by Republic holders. The reward of an open and above-board effort on the part of the officials of both companies to give their stockholders all possible information relating to a move which they believe will benefit all concerned is an injunction suit!

ONE wonders whether the alleged dangers of the consolidation had as much to do with the filing of the suit as the desire of a bureaucratic body to justify its perpetuation.

000,000 and Corrigan-McKinney has assets of approximately $65,000,000. The petition alleged that the two companies combined will sell more than 16 per cent of the semi-finished steel produced for sale in the entire United States and 12 per cent of the merchant bars produced for sale in the United States.

It is alleged in the petition that the corporations involved have already obtained the consent of more than two-thirds of each class of stockholders and that unless enjoined they will consummate the merger within approximately 10 days. A temporary injunction is sought pending the final determination of the case.

On the same day that the Department of Justice filed the petitions in Cleveland against the steel companies and directors, it announced a list of 26 anti-trust cases which are now pending, indicating that it is intensifying prosecution in this field. The Cleveland cases were the only ones which involve steel.

Company Officials Surprised

Expressing surprise at the Government action against the proposed Republic-Corrigan, McKinney merger, T. M. Girdler, president and chairman of Republic, and Donald B. Gillies, president of Corrigan-McKinney, in Washington when the suit was filed, issued a joint statement declaring that the proposed merger, approved by the owners of more than two-thirds of the Republic and 98 per cent of the Corrigan-McKinney stock has no purpose or effect in restraining trade.

It was stated that the sole purpose of the merger is to create a sound economic unit that could compete more effectively with the numerous other strong steel companies in the same territory and that as a result competition would be increased rather than diminished. It was added that the merged company, by reason of the resulting greater efficiency, would be able to play a more important part in the much needed revival of the heavy industries which the Government is trying to bring about.

The text of the statement follows:

> We are amazed that the Government has filed suit to prevent the merger of the Republic Steel Corpn. and the Corrigan, McKinney Steel Co. Until we have had an opportunity to study the petition, we can make no statement as to the grounds or effect of the suit. However, from our knowledge of the situation we feel sure we should be able to satisfy any requirement of the law.
>
> This proposed merger, which has the approval of the owners of more than two-thirds of Republic stock and 98 per cent of Corrigan, McKinney stock, has no purpose or effect in restraining trade.
>
> As they stand each company has certain deficiencies in plant and equipment which the other could supply. The sole purpose of the merger is to create a sound economic unit that could compete more effectively with the numerous other strong steel companies in the same territory. Thus competition would be increased—not diminished.
>
> Furthermore, the merged company, through the greater efficiency that would result, would be able to play a needed revival of the heavy industries more important part in the much which the Government is trying to bring about.

On Friday Mr. Girdler and Mr. Gillies stated that meetings of the boards of directors of the two companies will be held within the next few days to consider the action to be taken by the two companies in view of the Government's suit, after which letters will be sent to stockholders advising them of the steps which the companies will take.

Industrial Supply Dealers Would Stop Price Cutting—Other Code News

WASHINGTON, Feb. 12.—A hearing was held last week on an amendment to the code for the industrial supplies and machinery distributers' trade. The amendment would forbid "wilfully destructive price cutting," and price filing would be made mandatory upon all members of the trade in any regional area where a majority elected to file prices. Members desiring to sell in areas, other than their "home" region, would be compelled to file their "home" prices in all such outside areas.

George W. Eckhardt, Philadelphia, corresponding secretary of the code authority, filed a list of 31 such territorial trade areas into which the United States has been divided, and said these divisions had been developed by the trade itself on the basis of "efficiency in service." He stated there had been very few trade practice complaints arising under the code and that these had been promptly handled by the various regional committees involved. Asked by Mr. Cook how many members of the trade had voted for the proposed amendment, Mr. Eckhardt stated questionnaires had been sent out to some 700 known firms and that of these 169 had returned ballots, of which 133 favored the amendment. Fifteen trade areas were said to be voluntarily filing prices.

J. Robert Kelley, representing Manning, Maxwell & Moore, Inc., Jersey City, N. J., said 116 members of the trade in the New York area are filing prices on 150 lines of merchandise. This activity, he said, embraced the filing of some 40,000 prices. George A. Fernley, Philadelphia, secretary of the code authority, said that the code had operated to reduce complaints of "wilful and destructive" price cutting. He urged that the proposed amendment be amended to prohibit only sales below the filed price and not to prohibit, as written, sales as "other than" the price previously filed.

Alvin M. Smith, member of the code authority and president of the Smith-Courteney Co., Richmond, Va., supported the proposed provision requiring the filing of uniform area prices. The amendment, he stated, would be a "life saver" to small dealers, particularly in the South, who were said to be suffering from the inroads of larger concerns which, it was stated, make a practice of selling goods in a number of areas at prices lower than those asked in the seller's home district. Mr. Smith said the amendment would tend to reduce costs to the consumer since the tendency would be for the seller to file his "absolute minimum" price, whereas the former practice was to ask "all the buyer was judged willing to pay."

TEXTILE MACHINERY

The code authority for the textile machinery manufacturing industry has made application to the NIRB for approval of its $35,000 budget and basis of contribution for the period from Nov. 1, 1934, to Oct. 31, 1935.

ROAD MACHINERY

Suggestions or objections to the approved definitions of resale values of second hand or old road machinery equipment, submitted to the NIRB by the industry's coordinating committee, must be filed with Deputy Administrator Neal W. Foster, 539 Investment Building, Washington, before Feb. 16. The regulations defining resale value of second hand or old equipment were approved by the board Feb. 1. They constitute a system of open filing of trade-in allowance terms.

WOODWORKING MACHINERY

Suggestions or objections concerning the proposed amendment to the woodworking machinery code, a subdivision of the machinery and allied products industry, pro-

viding for a mandatory budget system must be filed with Deputy Administrator Neal W. Foster, room 539, Investment Building, Washington, before Feb. 21.

PACKAGING MACHINERY

The NIRB has approved an application of the packaging machinery industry and trade code authority, for permission to expend from surplus funds available Jan. 1, 1935, a portion sufficient to cover expenses for the months of January, February and March, 1935, in a total amount not to exceed the actual expenses incurred during October, November and December of the budgetary period which ended Dec. 31, 1934, pending the approval of the 1935 budget and basis of contribution.

COMPLETE WIRE AND IRON FENCE

An amendment to the supplementary code for the complete wire and iron fence industry, providing that the open price filing requirement shall not apply to export shipments, has been submitted to NRA by the supplementary code authority. Suggestions or objections concerning the amendment must be filed before Feb. 25. with Deputy Administrator H. Ferris White, 1518 K Street, N.W.

WIRE ROPE AND STRAND

Objections or suggestions concerning the application of the supplementary code authority for the wire rope and strand manufacturing industry, for exemption from certain of the code's trade practice provisions for those selling direct in the oil country in competitition with the members of the American petroleum distributing trade, must be filed with Deputy Administrator H. Ferris White, room 510, 1518 K Street, N.W., before Feb. 11. This is a correction of an order, dated Jan. 23, which was erroneous.

ALLOY CASTING

The code authority for the alloy casting industry has submitted a proposed modification to its budgetary basis of contribution, which, if granted, will require every person subject to its terms to contribute to the expense of administering the code. The total approved budget for the industry from Feb. 4, 1934, to June 16, 1935, is $27,303.48.

MINE CAR MANUFACTURING

The NIRB has approved the supplemental code of fair competition for the mine car manufacturing subdivision of the machinery and allied products industry. The code carries the same general labor provisions of the master machinery code, with the basic 40-hr. maximum work week and minimum 40c an hr. wage rate.

The mine car manufacturing subdivision includes the manufacture for sale or lease of non-powered wheeled vehicles not exceeding 350 cu. ft. level full capacity such as are customarily used in coal mining; chilled cast iron mine car wheels, and parts and repairs for such vehicles. Included in the code are provisions containing definitions, methods and procedures for handling bids, price filing, discounts, other trade practices, and a code authority of seven industry members.

Annual sales dropped from $7,668,520 in 1929 to $2,529,967 in 1933, while employment declined from 1,651 in 1929 to 1,323 in 1933, or 19.8 per cent, it was reported.

INDUSTRIAL WIRE CLOTH

The NIRB has approved a trade practice appendix for the industrial wire cloth manufacturing subdivision of the fabricated metal products manufacturing and metal finishing and metal coating industry. The approval order stays the code provision forbidding sales below the individual member's cost, so far as it applies to the subdivision. The appendix becomes effective Feb. 18.

INDUSTRIAL FURNACE

The code authority for the industrial furnace manufacturing industry has made application for approval of a $7,000 code administration budget for the calendar year 1935, and the basis of contribution by industry members to cover said budget.

ROAD MACHINERY

The coordinating agency for the road machinery manufacturing industry has made application for approval of a $23,120 code administration budget for the year ending Dec. 31, 1935, and the basis of contribution by industry members to cover said budget.

PIPE TOOL MANUFACTURING

The supplementary code authority for the pipe tool manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, has applied to the NIRB for approval of its $4,000 budget and basis of contribution for the period from Sept. 3, 1934, to June 16, 1935. It has also made application for termination of the exemption in Administrative Order X-36, whereby a firm is exempted from contributing to code expenses other than to those covering its principal line of business.

SPROCKET CHAIN

The code authority for the sprocket chain industry, a division of the machinery and allied products industry, has made application for approval of its budget for the period from Jan. 1, 1935, to June 15, 1935. The total budget is $5,100, and the basis of contribution is as follows: One-tenth of one per cent of the total sales volume of the employers in the sprocket chain industry for the calendar year of 1934. The assessments are payable monthly.

REFRIGERATION VALVES AND FITTINGS

The supplementary code authority for the refrigeration valves and fittings manufacturing industry has made application for termination of the exemption in Administrative Order X-36, which exempts a firm from contributing to codes other than to that covering its principal line of business. Suggestions or objections to this action of the code authority must be submitted to Deputy Administrator Beverly S. King, before Feb. 16.

ROOFING AND SHEET METAL CONTRACTING

The divisional code authority for the roofing and sheet meetal contracting division of the construction industry has made application for approval of its budget for the period of Jan. 26, 1935, to March 15, 1935. The total budget is $156,100.

PACKING MACHINERY

The NIRB has announced that the code authority for the packing machinery industry and trade has applied for approval of its budget for, and of the basis of contribution by members of the industry and trade to, the expense of administering the code for the period of one year, beginning Jan. 1, 1934. The total amount of the budget for the period is $9850. The proposed basis of contribution is "one mill per dollar of 1933 gross sales."

BOILER MANUFACTURING

A public hearing will be held Feb. 19, in Washington, on proposed amendments to the code of fair competition for the boiler manufacturing industry. The amendments deal with the filing of price lists, liquidated damages plan for violations of the code, child labor, and safety and health of employees.

By the same date suggestions or objections concerning the proposed standard forms of contract performances and regulations for performance predictions must be filed with Beverly S. King, Room 3076 Department of Commerce Building. The proposed standard forms were presented by the industry code authority.

METALLIC WALL STRUCTURE

The code authority for the metallic wall structure industry has made application for approval of a proposed amendment to the code as follows: Insert in Section 1 of Article II of the code, following the words "includes the manufacture and/or sale," the words "and/or offer for sale."

VALVE AND FITTINGS

The code authority for the valve and fittings manufacturing industry has made application to NRA for approval of its $97,800 budget and basis of contribution for the period of Jan. 1, 1935, to Dec. 31, 1935. The basis of contribution is one-fourth of one per cent of the dollar sales of the members of the industry based on a 12-months' average derived from the sales for the 18 months' period beginning Jan. 1, 1933, and ending June 30, 1934.

CODE AUTHORITIES NAMED

The NRA has announced approval of the following members of code authorities:

Bright Wire Goods Manufacturing Industry—R. D. H. Vroom, H. L. Judd Co., New York; H. A. Parks, Sargent & Co., New Haven, Conn.; John Tomajan, Washburn Co., Worcester, Mass.; C. O. Larson, Charles O. Larson Co., Sterling, Ill.; and E. F. Lawrence, Jr., Lawrence Brothers Co., Sterling, Ill.

Preformed Plastic Products Industry—H. L. Rogers, Flooring & Expansion Joints, Johns-Manville Corpn., New York; W. R. Meadows, W. R. Meadows, Inc., Elgin, Ill.; and A. C. Fischer, Servicised Products Corpn., Chicago.

Steam Engine Manufacturing Industry—W. S. Elliott, Elliott Co., Pittsburgh; A. E. Ballin, Nordberg Mfg. Co., Milwaukee; Albert Bradley, Ames Iron Works, Oswego, N. Y.; E. H. Brown, Allis-Chalmers Mfg. Co., Milwaukee; and A. D. Skinner, Skinner Engine Co., Erie, Pa.

Vacuum Cleaner Manufacturing Industry—C. G. Frantz, Apex Electrical Mfg. Co., Cleveland; R. J. Simmons, Birtman Electric Co., Chicago; C. G. Groff, Electrolux, Inc., New York; J. Tuteur, Electric Vacuum Cleaner Co., Inc., Cleveland; Fred Wardell, Eureka Vacuum Cleaner Co., Detroit; P. A. Geier, P. A. Geier Co., Cleveland; and H. W. Hoover, Hoover Co., North Canton, Ohio.

Woodworking Machinery Division of the Machinery and Allied Products Industry—Paul Gardner, De Walt Products Corpn., Lancaster, Pa., as non-association member on the divisional code authority.

Proposed Reduction in Duty on Brazilian Manganese Ore Arouses Much Protest

WASHINGTON, Feb. 12.—From the viewpoint of the iron and steel industry, chief interest in the proposed reduction of 50 per cent in manganese ore provided for in the American-Brazilian reciprocal tariff agreement relates to the price situation. It does not confine itself to a possible cut in the price of manganese ore but also in ferromanganese.

It has not been made known as yet whether the cut in duty would apply solely to Brazil or to other manganese producing countries, including the West Coast of Africa, the Gold Coast of Africa and India. Soviet Russia, the principal source of manganese ore imported into the United States, apparently would not be granted the reduced duty. At least, not for the present, by reason of the deadlock that developed in negotiations between the State Department and Russia over the debts of the latter country to the United States and the abandoning of the negotiations.

The contention has been made that, if confined to Brazil, the lowered duty on manganese ore would inevitably bring in larger quantities from that country over and above those now already owned by American steel interests. The manganese ore from Brazil ranges from 42 to 48 per cent in contained manganese. Striking an average of 45 per cent, the new duty of one-half cent per pound would amount to $5.14 per ton as against an estimated total of $10.08 as at present, or a reduction of $4.94. Taking 2¼ tons of manganese ore to a ton of standard ferromanganese the reduction reflected in a ton of the ferroalloy would be $9.88.

Even if the reduced duty were applicable solely to Brazil it is the view in some quarters that it would, through newly set up competitive conditions, compel a cut in the price of foreign ferromanganese made from ore originating in the other producing countries.

Russia Leading Manganese Source

The largest source of manganese ore imports in 1934 was Soviet Russia, which provided 61,075 tons of contained manganese, ranging from 48 to 51 per cent manganese content, out of total imports of 134,856. Ranking second was the Gold Coast of Africa, which supplied 36,914 tons of manganese ore whose metallic content ranged from 48 to 50 per cent. Brazil ranked third, providing 24,484 tons, but in 1933 no imports were received from the latter country.

The domestic manganese ore legislative bloc, which is vigorously fighting the proposed cut in the duty on manganese ore, plans to prevent extension of the slash to other countries if it should be applied to Brazil. Secretary Hull, in his hard-hitting statement about high tariff lobbyists trying to defeat his reciprocal tariff agreement with Brazil on account of the proposed manganese ore duty cut, made a vigorous defense of his action. Ironically enough most of the bloc moving against the duty reduction are made up of Southern and Western Democrats, members of Mr. Hull's own party. Members of Congress from these sections were responsible for the placing of the 1c. a lb. duty on manganese ore. It was of course bitterly fought by the steel industry.

Secretary Hull, in purposely bringing on a fight with the legislative bloc opposing the manganese ore duty, saw in the action not simply a stroke against the lowering of this duty, which he held to be indefensible, but also considered it as a forerunner to a general attack on his reciprocal tariff bargaining efforts.

Production Not Increased

In a prepared factual statement, Mr. Hull showed that the high tariff on manganese ore, placed at 110 per cent, had not brought about increased domestic production. He pointed out that in the years between 1923 and 1928 domestic production averaged only 8.3 per cent of domestic consumption while domestic producers in contending for a duty, applied in 1922, said they could supply from 50 to 75 per cent of the domestic consumption. He also pointed to the fact that in 1923-28 the value of all domestic manganese ore produced was $7,617,800, while duties collected on imported manganese in the same period were $31,773,480. It was estimated by Secretary Hull that during those years manganese ore consumers paid a tax, as a result of the duty, of $98 for every ton produced in the United States.

It was charged by Secretary Hull that "tariff lobbyists" were combining and by means of their propaganda "seeking to kill all efforts to restore normal world trade—a trade upon which the employment of millions in this country and tens of millions in the world is dependent."

"This propaganda would make it seem that the proposed reduction of duty on manganese ore from 110 per cent for 1933 to 55 per cent will throw many thousands of American wage earners out of employment and wreck a great nation-wide industry," Mr. Hull declared. "This combined propaganda is the rebirth of the old log-rolling system which gave us the Smoot-Hawley misery of the past few years."

While there will be distinctly sharp disagreement with Mr. Hull's low tariff views and his attitude toward the Smoot-Hawley act, he went on to cite figures showing that the number of wage earners mining manganese ore in the United States is only a few hundred out of a total of about 45,000,000.

Imports of ferromanganese in 1933 totaled 32,442 gross tons of which 19,011 tons came from Canada and 11,732 tons came from Norway, according to the Bureau of Mines. Domestic production of ferromanganese in that year was 136,267 gross tons and was made in five furnaces by five different operators. Shipments were reported from four plants.

Imports of Manganese Content by Principal Countries*

(Gross Tons)

	1931	1932	1933	1934
Total	245,910	53,553	79,391	134,856
Brazil	59,174	9,494	...	24,484
Gold Coast	43,908	12,204	22,392	36,914
India	24,646	909	...	10,168
Soviet Russia	99,335	27,206	4,189	61,075

*Figures for 1931 to 1933 from Bureau of Mines; 1934 from Bureau of Foreign and Domestic Commerce.

To Discuss Welding

THE department of industrial engineering of the Ohio State University, Columbus, will hold its fourth annual welding conference Feb. 28 and March 1 in the Industrial Engineering Building of the university. A comprehensive program of papers, demonstrations and exhibits has been arranged. Communications should be addressed to O. D. Rickly, assistant professor of industrial engineering.

NRA Report of Automotive Labor Conditions is Severely Critical

A SEVERE indictment of the policies of car manufacturers is contained in the preliminary report "on study of regularization of employment and improvement of labor conditions in the automobile industry" made by the research and planning division of NRA in collaboration with the bureau of labor statistics of the Department of Labor. Chief recommendation, already acted upon voluntarily by members of the Automobile Manufacturers' Association, is for fall introductions of new models. If this fails to give workers "the income and security necessary to dissipate considerable unrest," dismissal wages are proposed as a means of regularization. Such wages would take the form of "a stipulated extra hourly compensation to be paid at layoff or dismissal to such workers as have not worked a certain stipulated number of hours since being hired."

The present system of crowding motor car production into a few months of the year, says the report, causes substantial loss of efficiency, involving excess overhead due to limited employment of plant capacity, excessive labor turnover, cost of training new employees, inefficiency because of extra shifts, wastage and spoilage, and higher cost of materials and dies on a rush order basis. It urges that the regulations of the industry regarding maximum hours be changed to 40 per week, with an eight-week period during the peak production season when the limit can be raised to 48 hr. However, the present averaging of hours over a year's time would be eliminated.

Says Independents Weakened

The report views with alarm the weakened position of independent companies which, at the end of 1933, had left 73 per cent of their fixed assets of 1929, 59 per cent of their total assets, 41 per cent of their current assets and 35 per cent of their cash. For this reason it is suggested in connection with fall announcements that consideration be given requests for exemption "for any small company which conclusively demonstrates that to follow this program would seriously impair its competitive position in the industry." The report urges the Government to avoid doing anything which would further concentrate business in the hands of General Motors, Ford and Chrysler. It declares that "the contributions of small companies far exceed their importance in rank of production. The values of preserving the status of the efficient smaller units are obvious even to the most casual observer."

Although commending the industry for its "multitude of positive contributions to the social and economic progress of the country" and pointing out that for 15 years "80 per cent of the capital of eight leading companies came from reinvested profits which were plowed back and used to build the plants and purchase the equipment of the companies today," the report savagely assails the industry for its labor policies, particularly during the depression years. It charges that labor unrest exists to a degree higher than warranted by the depression, that competition has spurred the "speed-up" to a point "beyond human capability to produce day by day," that while hourly earnings are high annual incomes are extremely low, and that a well-organized espionage system is operated by individual car manufacturers. Most blistering of the indictments named in the report pertains to the dropping of men past 40 years of age—"it is socially and economically indefensible for an industry of this size to say that old age comes to its workers from 10 to 20 years prior to the time it comes to any other group of similar workers in the United States."

Annual Workers' Incomes Vary

It is revealed that annual incomes vary greatly from plant to plant. The Packard Motor Car Co. is singled out for special mention because of its efforts over a period of years to stabilize employment. In 1934 over 92 per cent of its workers were employed at least 40 weeks and 76.3 per cent 50 or more weeks. Annual earnings last year of 53 per cent of the company's workers exceeded $1,200. In contrast to this commendable condition, another manufacturer employed only 30 per cent of its workers for 40 weeks and 11.5 per cent for 50 weeks or longer. Over 27 per cent of its workers were employed less than 14 weeks. Annual earnings of only 23 per cent of the workers employed in the peak month equaled $1,200, while 32 per cent earned less than $400.

Median annual earnings of automotive tool engineers dropped from $2,717 in 1929 to $1,300 in 1933, rising to $1,920 last year. It is estimated that there are about 15,000 tool and die makers in the Detroit area. Certain companies already are trying to regularize employment in this group by transferring the men in off seasons to various production occupations, particularly die setting in press shops.

Figures submitted by the industry to the commission headed by Leon Henderson which prepared the report show that a new model stimulates sales the month of its introduction 43 per cent above the month's seasonal average, and about 37 per cent the second month. The effects have worn off after the fourth month and by the eleventh month the influence of the approach of new models causes a drop of 20 per cent below the seasonal average. Fall introductions, concludes the report, should enable the industry to capitalize possibilities of higher sales late in the year in the South and on the Pacific Coast, where winter weather is not severe enough to interfere materially with motor car operations the year round.

Ways to Spread Employment

Production of commercial cars and trucks, so far as possible, in slack seasons of passenger car output also would aid in regularizing employment, suggests the report. Further cultivation of markets in the south temperate zone (Argentine, Australia, South Africa, New Zealand) offers interesting possibilities, although admittedly other important factors are involved, such as tariffs and exchange rates.

Manufacture of parts for stock ahead of assembly requirements, particularly in off seasons, would help smooth out employment curves. The report finds that 50 to 60 per cent of the labor on an automobile represents labor on parts made in the car factory or by a supplier, 10 to 15 per cent is tooling labor and 30 to 35 per cent is labor on assembly of the body. One of the large companies (presumably General Motors) had in stock on Jan. 1, 1935, $3,000,000 of finished parts produced prior to scheduled use in a manner never before attempted. The company's man-hours per car produced for October and November were over 2½ times as much as those for the same months of 1933.

Smaller automobile companies as well as some parts companies may see financial inhibitions to the stocking of parts, declares the report, which points a way out of such a situation by having companies negotiate short term bank loans for this purpose.

Official condemnation is heaped upon car makers for their methods of purchasing parts. They have followed policies which led to creation of a surplus of suppliers over the required number, thus bringing about "a highly competitive situation . . . which the vehicle manufacturer has apparently used rather selfishly at times to obtain the lowest of prices."

Urges Buying Ahead

One passage in the report must sound familiar to steel executives and parts suppliers. It reads, "It is an unpardonable sin for any supplier to be the cause of a break in the automobile manufacturer's production, regardless of who is at fault." The practice by car makers of restricting purchase commitments to a weekly or at most a monthly basis results in abnormal production costs and irregular employment of labor by parts suppliers. On account of the industry's insisting upon suppliers assuming almost all responsibilities in relation to car parts, even to the extent that "some automobile manufacturers literally use the material in transit, in freight cars, and on trucks as their only parts stock," operating losses are often sustained by suppliers on what appeared to be, and should be, profitable production, quoted prices having been computed on a basis of somewhat constant and uniform runs.

Parts manufacturers have attempted to diversify their products in order to utilize equipment and plant facilities in the automotive off. seasons, but in so doing have run up against a real difficulty. If they are to retain their motor car business, they must have all their facilities available for an immediate turn to the demand which may be made upon them for production, thus precluding the tying up of equipment on other work.

Statistics Presented

Factual material presented in the report showed that:

1. The existing production rate for a large car manufacturer is one car per day for each 16 men employed, whereas the rate in 1930 was one car for 24 men.

2. The automobile industry (including parts makers) spends 59 per cent of its net sales in purchasing materials from companies outside the industry.

3. Manufacturing economies instituted by a company building a popular-priced car have resulted in the body being made today for $30 less than in 1929, notwithstanding the increased amount of steel used.

4. Reductions in labor costs have considerably more than offset increased tool and die costs for car bodies (one-piece steel top and one-piece steel underbody are cited as examples).

5. There has been a marked reduction in operations necessary to make a car, mostly by combining two or more operations into one. This has cut down production costs (today a top is made from a single steel stamping. It 1929 the top fabricated by the same body company consisted of 47 separate parts assembled into a single unit).

6. Five years ago it cost a well-known car maker $13.20 per operation to finish 100 cylinder blocks. The cost at present is $5.20.

Car Manufacturers Question Generalities

DETROIT, Feb. 12.—Car manufacturers refuse to comment officially on the NRA report making specific recommendations of measures to be taken to regularize employment and increase workers' annual incomes and condemning the industry for certain practices relating to labor. Unofficially, however, and "off the record," they are shooting many critical darts at the report and are questioning general statements for which they say proof is lacking.

The industry is united in its stand against the recommendation that the maximum work-week be 40 hr. with no averaging allowed over a period of time, the only concession being an eight-week spring bulge when men might be employed 48 hr. a week. Individual companies emphasize that adoption of such a policy would increase greatly costs of production which already have soared considerably in the last year and a half. It would necessitate higher retail prices of cars and thereby defeat the principle stated in the report itself that "the greatest reemployment possibilities exist in the hopes for greater production of consumer-durable goods (housing, automobiles, refrigerators, etc.) and . . . that only through lowered unit costs can the greatest flow of goods and services be attained."

Recommendations in the report for fall introductions of new models have been "lifted" almost word for word from a report made to NRA by the Automobile Manufacturers' Association in December, 1933. At a meeting on Dec. 11, 1934, before the Henderson-Lansburgh-Lubin commission began its open hearings in Detroit, car manufacturers decided to put the proposed plan into effect.

On the subject of discharging men when they reach 40 and of refusing to employ applicants who are of middle age, the industry claims its record is as clean as that of any other industry. One of the larger manufacturers says that almost half its workers are 40 or older and a surprisingly good percentage of employees range from 50 to 60 years of age.

Manufacturers do not concede the fact that in the automobile industry labor unrest exists to a degree higher than warranted by the depression, as stated in the report. They say that much of the unrest is attributable to agitation fomented by union organizers and to such factors as the NRA report itself which pretends to make generalized statements not supported by facts and figures.

As for the so-called speed-up and low incomes of workers, the industry feels that the situation certainly is no worse than in other industries. One executive made the comment that apparently the commission which made the study isn't aware of the fact that the country has been in the midst of a depression and isn't out of it yet. After he had looked over the statement that workers are suffering from inadequate incomes, he remarked, "Aren't we all?"

Meeting Demands of Labor

In transmitting the report to President Roosevelt, the NIRB recommends that a comprehensive automotive industry labor relations board be established under authority of NIRA and of Public Resolution 44 of the last session of Congress. On this point NRA supports the demands of the American Federation of Labor and comes into direct conflict with the industry itself, which is giving wholehearted support to Dr. Wolman's Automobile Labor Board. The possibility of immediate consideration being given by the White House to this proposal has already faded with President Roosevelt's vigorous public statement backing the present board to the fullest extent.

The feeling in Detroit is that the commission, with the sympathy of its members leaning toward the left anyway, set out with the deliberate intention of trying to put the industry on the spot.

Steel Production Suffers First Major Setback Since August

Ingot Rate Falls From 56½ to 53½ Per Cent, South Alone Registering A Gain—Scrap Index Remains Unchanged for Third Week

STEEL ingot output, declining from 56½ to 53½ per cent of capacity, has suffered its first important setback since last August.

The reversal is due in part to technicalities of the steel code which require the completion of shipments against contracts before the expiration of each calendar quarter. So long as finishing mills could still book orders for the current quarter the pressure for raw and semi-finished steel increased. Now that makers of cold-finished sheets, wide cold-rolled strip and other materials used for automobile manufacture are fully committed, more accurate estimates of the steel needs of the mills can be made.

CONCURRENT with the readjustment of ingot output to finishing requirements there has been some relaxation of demand from the consuming trade. In the case of light flat-rolled products the current lull is ascribable in large part to the sold-up condition of the mills. Producers cannot open their books for second quarter until March 1 and a renewal of buying on a large scale is looked for soon after that date. Already some of the large buyers in the automotive field have tried to place tonnage for the next three-month period, and, while orders cannot now be accepted, tentative allotments are being made pending the time when formal contracts can be entered.

An early resumption of active demand is also indicated by the fact that producers are putting blast furnaces on reduced draft instead of taking them off entirely. Nevertheless, sentiment in the steel trade, which is unusually sensitive, has been unsettled. More is now heard of accumulations of steel stocks by one or two of the leading motor car makers and there are again pointed references to the gold clause case, political variables and other uncertainties that are chilling business enthusiasm.

MOTOR car production shows no let-up. Unless labor disturbances intervene, total assemblies for this month should range from 360,000 to 380,000, while March output is expected to exceed 400,000 units. A possible recession in steel purchases by Ford is expected to be offset by heavier orders from Chevrolet and other General Motors units.

Railroad buying and construction work are counted on by the mills to act as supporting influences in the second quarter if demand from the motor car industry falls off. Winter rollings of rails have been unusually light and, even if expenditures for track are kept at a minimum, a sizable amount of delayed tonnage should reach the mills in the spring. An accumulation of orders for 50,000 tons, including 15,000 tons from the St. Louis-San Francisco, 15,000 tons from the Louisville & Nashville, 12,500 tons from the Southern Pacific and 3800 tons from the Central of Georgia, has enabled the Alabama rail mill to resume operations for a sustained run. The Milwaukee road plans to buy 10,000 tons of rails.

The Cincinnati, New Orleans & Texas Pacific has ordered 300 automobile cars. The Burlington contemplates building 500 composite coal cars in its own shops. The New York Rapid Transit Co. will take bids March 1 on 25 five-section articulated subway cars.

Structural steel awards of 9655 tons compare with 16,600 tons in the previous week. New projects total 5800 tons as against 16,150 tons a week ago. Plate lettings aggregate 1130 tons, and fresh inquiries 2250 tons.

SCRAP prices, although weaker in most markets, are showing resistance in the face of the drop of steel production. THE IRON AGE scrap composite remains unchanged for the third week at $12.17 a ton.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at $17.90 a ton and 2.124c. a lb. respectively. A bidder on 2400 tons of reinforcing bars for a Government project in Ohio entered a quotation of $2 a ton below the code price but later withdrew it. No important code price changes for the second quarter are looked for. Bolts and nuts, however, may be advanced slightly.

Ingot output is off four points to 41 per cent at Pittsburgh, two points to 65 per cent at Chicago, one point to 60 per cent in the Valleys, two points to 67 per cent in the Cleveland-Lorain area, and five points to 90 per cent in the Wheeling district. In the South, production has risen from 29 to 50 per cent.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous

Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Feb. 12, 1935	Feb. 5, 1935	Jan. 15, 1935	Feb. 13, 1934
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$19.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	18.13
No. 2, Birmingham†	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.	19.76	19.76	19.76	18.76
Basic, Valley furnace	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	19.76
Malleable, Chicago*	18.50	18.50	18.50	17.50
Malleable, Valley	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.54
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	26.00
Slabs, Pittsburgh	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.80	1.80	1.80	1.75
Bars, Chicago	1.85	1.85	1.85	1.80
Bars, Cleveland	1.85	1.85	1.85	1.80
Bars, New York	2.13	2.13	2.13	2.08
Plates, Pittsburgh	1.80	1.80	1.80	1.70
Plates, Chicago	1.85	1.85	1.85	1.75
Plates, New York	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.70
Structural shapes, Chicago	1.85	1.85	1.85	1.75
Structural shapes, New York	2.05¼	2.05¼	2.05¼	1.95¼
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.40

Finished Steel

	Feb. 12, 1935	Feb. 5, 1935	Jan. 15, 1935	Feb. 13, 1934
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh	2.60	2.60	2.60	2.35
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.40
Plain wire, Pittsburgh	2.30	2.30	2.30	2.20
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.25
Barbed wire, galv., Pittsburgh	3.00	3.00	3.00	2.85
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.90
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.25	$13.25	$13.50	$13.75
Heavy melting steel, Phila.	11.75	11.75	11.75	11.75
Heavy melting steel, Ch'go.	11.50	11.50	11.75	10.75
Carwheels, Chicago	12.00	12.00	12.00	11.25
Carwheels, Philadelphia	12.50	12.50	10.75	12.75
No. 1 cast, Pittsburgh	13.75	13.75	12.75	12.25
No. 1 cast, Philadelphia	11.00	11.00	11.00	12.50
No. 1 cast, Ch'go (net ton)	10.00	10.00	11.00	9.50
No. 1 RR. wrot., Phila.	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net)	9.50	10.00	11.00	9.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$3.50
Foundry coke, prompt	4.60	4.60	4.60	4.25

Metals

	Feb. 11			
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.75	7.75
Lake copper, New York‡	9.12½	9.12½	9.12½	8.00
Tin (Straits), New York	50.75	51.15	50.55	51.65
Zinc, East St. Louis	3.70	3.70	3.75	4.40
Zinc, New York	4.05	4.05	4.10	4.75
Lead, St. Louis	3.35	3.35	3.55	3.90
Lead, New York	3.50	3.50	3.70	4.00
Antimony (Asiatic), N. Y.	14.50	14.50	14.50	7.15

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Feb. 12, 1935	2.124c. a Lb.	$17.90 a Gross Ton	$12.17 a Gross Ton
One week ago	2.124c.	17.90	12.17
One month ago	2.124c.	17.90	12.33
One year ago	2.008c.	16.90	12.08
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1934	2.199c., April 24;	2.008c., Jan. 2	$17.90, May 1;	$16.90, Jan. 27	$13.00, Mar. 13;	$9.50, Sept. 25
1933	2.015c., Oct. 3,	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 1
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Pittsburgh Output Dips Four Points to 41 Per Cent

Valley Average Recedes One Point to 60 Per Cent and Wheeling District Rate Is Off Five Points to 90 Per Cent

PITTSBURGH, Feb. 12.—Steel ingot output in the Pittsburgh district this week has dropped four points to 41 per cent of capacity, the first decline in eight weeks. Production in the Valleys and nearby northern Ohio mills will average about 60 per cent of capacity, while output in the Wheeling district has declined five points to 90 per cent. The drop in raw steel output more than reflects a shrinkage in finished steel bookings. Although it is difficult to define clearly the present recession, the fact that some producers have put blast furnaces on reduced drafts instead of taking them off entirely indicates some expectations of an early resumption of buying on a major scale.

The movement of semi-finished steel, excepting possibly sheet bars, evidently has caught up with finishing mill demands. Automotive orders for forging stock, hot-rolled bars and cold-rolled bars are appearing less frequently, but the demand for finished sheets and strip is well sustained.

A let-up in tin plate specifications has not noticeably affected average operations for the industry of 75 per cent of capacity. An improved demand for tubular products is reported.

The rail and track accessory market still is a dull affair, while construction projects continue to be too limited to augur early swelling of structural mill backlogs.

The award of 300 automobile freight cars to a car construction company in this district may stimulate an early demand for plates, since the order is for early completion.

Pig Iron

The small-lot business characteristic of this market manifests no definite trend this week. The current spread between cupola cast scrap and pig iron is around $4.50 a ton, which continues to be a real inducement to melters to use heavy scrap charges. Shipments thus far in February are at a rate slightly higher than that in the fore part of January.

Semi-Finished Steel

The general movement of semi-finished grades is slower, with the possible exception of sheet bars, which still are in strong demand from non-integrated tin plate producers. Forging stock is a shade quieter in consequence of a noticeable let-down in automotive demand for steel. Skelp appears to be more active, while wire rods are holding their own.

Bolts, Nuts and Rivets

Producers in this district are participating in a small way in automotive demand. General releases on first quarter contracts continue to be in meager volume. Railroad construction and repair work are adding little to present activity. Prices are fairly steady, but concessions in some districts have not entirely disappeared.

Rails and Track Accessories

Few new inquiries are reported in this market. Demand for track fastenings apparently has not kept pace with recent rail purchases, although some inquiries are believed to be in the making. The local rail mill is fairly steadily engaged on a moderate backlog of orders and probably will continue at the present rate for another month.

Bars

A slight let-up in automotive orders is reported. Similar tendencies are noticeable in other major consuming lines, but the aggregate loss in bar orders is not yet alarming. The automotive trade is believed temporarily to have covered for its early requirements and is expected to reenter the market in a large way later this month.

Reinforcing Steel

Specifications are being retarded by severe weather conditions in some areas. New orders booked by mills in this district are infrequent and usually for small tonnages. The low bidder on 1200 tons of reinforcing bars for the Mohawk dam, included in the Muskingum Conservancy District projects, bid 10c. a 100 lb. below the published quotation. No prior filing of a lower price for application to this project is reported, and it is believed doubtful that the lower quotation made would be acceptable to code authorities despite the Presidential proclamation that code prices could be reduced 15 per cent on Government projects. Another bid on the Muskingum Valley project revealed that bending extras represented only one-half of the usual charges.

Cold-Finished Bars

The automotive industry is reported to have covered fairly well for its requirements this month, and cold-finished specifications from that industry are temporarily receding. Stocks in automotive centers are not heavy, however, and a resumption of buying on a parity with recent volume is expected in late February or early March. There has been a slight decline in demand from other consuming industries. Withdrawals from jobbers' stocks in January were not sufficiently heavy to initiate significant jobber buying early in February. The jobbing trade, however, is appearing in the market more frequently for small lots.

Plates and Shapes

New plate inquiry is limited, and pending business is making unusually slow progress toward actual contracting. The barge market at present offers the brightest prospect for early tonnage, while railroad car construction is not benefiting mills in this district noticeably. Structural awards reported here for the past week were disappointingly low in total volume and unimportant in individual tonnage. New specifications out for figuring offer little hope for any early swelling of structural mill backlogs.

Wire

Activity in this market is fairly well sustained by a steady demand for manufacturers' wire, spring wire and spoke wire for automotive consumption. Demand from the farm regions is not yet shaping up satisfactorily. Jobbing trade in the South and Southwestern sections is more encouraging than that in Northern and Western areas. Bolt wire is relatively quiet.

Tubular Products

Practically all grades of tubular goods, excepting line pipe, are in slightly heavier demand. Standard pipe is moving faster for small building construction, while interest from the oil fields in drill pipe, casing and tubing is spreading. Drilling in some areas likely will be increased as soon as more clem-

ent weather appears. A natural gas pipe line from Texas to St. Louis and Detroit, which would require an exceptionally large amount of line pipe, is not regarded seriously for the time being, since present trunk lines are believed to be wholly adequate to serve existing needs.

Sheets

Aggregate volume in the past week was unusually heavy, owing to a notable increase in miscellaneous business and to a sustained demand from automotive centers. The increase in miscellaneous specifications particularly was impressive. A leading producer in the past two weeks has booked the heaviest tonnage for any fortnight in the past several years. Insistent demands for shipment from motor car makers on certain finishes are still in evidence. Some difficulty is being experienced in meeting calls for cold-rolled stock, but the situation is less stringent where automotive companies can take cold-rolled cold-reduced sheets produced on old type mills. Estimated production of the sheet industry this week is unchanged at 65 to 70 per cent of capacity.

Tin Plate

Specifications are in lighter volume. Some mills have revised rolling schedules downward this week, but not enough to affect the average rate of 75 per cent for the tin plate industry. Operating plans in general, however, are more conservative, and some mills are trying to guard slim backlogs by decelerating rolling.

Strip Steel

Automotive buyers are not so insistent in their demands for hot- and cold-rolled strip steel. A fairly well sustained movement to automotive centers continues, however, and this market has not yet suffered a noticeable set-back. Demand from miscellaneous sources also is tending downward. Strip mills still are enjoying fair backlogs, but this week will be engaged slightly lower at around 65 per cent.

Coke and Coal

Merchant trading in practically all grades of coke and coal is on a spot basis. While blast furnace coke consumption has risen sharply in the past month, the increase has not benefited independent coke producers, since such needs are served by integrated coke operations. "Captive" mine production of coal in this district has increased rather sharply in the past week. A fair movement is reported in domestic and lump-sized bituminous coal, while industrial steam coals are moving irregularly to consumers not under contract.

Scrap

Trading in this market has been listless in the past week. A Pittsburgh district consumer has been buying small lots of No. 1 steel at around $13 a ton, delivered, but major offerings at that price are entirely lacking. The general trend of scrap prices is indefinite at the moment, both buyers and consumers apparently awaiting more definite developments in the course of steel production, which is temporarily headed lower. Selected railroad heavy melting steel is bringing around $14, delivered this district. No. 1 steel on the last Pennsylvania Railroad list was sold at $13.95, Johnstown. Mills in the Wheeling district remain out of the market despite the quiet tone of the scrap market. It is difficult to discern any underlying weakness in prices, which are nominally unchanged.

Construction Work Is Feature on Coast

SAN FRANCISCO, Feb. 11.—The purchase of 26,174 tons of rails by the Southern Pacific Co. has not yet been supplemented by track accessory orders. Bids have been taken on the 900,000 tie plates, 158,000 bolts and 6200 kegs of spikes.

PWA allotments for water system improvements have stimulated demand for cast iron pipe, although individual tonnages are relatively small. Seven new contracts were advertised during the week to increase the pending list to 5641 tons, most of which will be let within the next 30 days.

Increased scrap purchases for local mills and for export were reported for the first month of the year. Scrap prices show strength and an advance would not be altogether unexpected. Both mill and dealer inventories are comparatively low, although there is apparently no shortage at the source of supply.

At San Francisco, dates for bids have been set on two projects which have been in the offing for some time. A double 54-in. submarine pipe line across the bay will require 1500 tons of steel plates. Bids will be taken March 6. Plans for the Marina Junior high school specify approximately 1200 tons of reinforcing bars and an unannounced tonnage of structural steel. Lettings for a high school at Santa Ana, Cal., include 250 tons of structural steel to Pacific Coast Steel Corpn. and 322 tons of reinforcing bars to Soule Steel Co. Consolidated Steel Corpn. took 250 tons of structural steel for a school at Long Beach, Cal. Two bookings by United States Pipe & Foundry Co. totaled 535 tons of cast iron pipe. American Bridge Co. is reported as low bidder for furnishing 200 tons of structural steel for a Government warehouse at Grand Coulee dam, near Almira, Wash.

Scrap Market Is Stronger at Buffalo

BUFFALO, Feb. 12.—Steel works operations are continuing at the advanced rate of last week. Bethlehem's Lackawanna plant is operating ten open-hearths, Republic Steel Corpn. is running five, and Wickwire-Spencer Steel Corpn., two. The Seneca sheet division of Bethlehem is operating at 70 per cent of capacity. One of the Republic furnaces now in operation is the 100-ton unit, which is the equivalent of two furnaces.

The scrap market is exceptionally active, leading to the belief that a good-sized order is out. Transactions among dealers are brisk, with apparently a tremendous amount of scrap being moved. One dealer transaction involved the movement of 5000 tons at $12.50 for the No. 1 heavy melting steel and $11.50 for the No. 2 steel. There was 3000 tons in the New York Central list, but this went to Ohio, as did the Erie list. One mill here offered $12.50 gross for the scrap, New York Central tracks, but failed to get it. This plant bid $11.50 a gross ton for cut car sides, which is held to be the equivalent of $13 for No. 1 steel. A bid of $12.50 for the No. 1 steel in the Erie list failed to get the material. This figure would mean $12.68 delivered. At the present rate of open-hearth operation, approximately 40,000 tons of scrap is being consumed monthly by local mills. With supplies from the East going abroad, and from the southern tier of counties going to Pennsylvania and Ohio, a definite shortage is indicated.

Pig iron shipments continue in steady volume with no particular improvement over the past couple of weeks. Foundry melt is better. A second stack is scheduled to go into operation at Hanna Furnace Corpn. by March 15 or April 1.

Chicago Rate is Down Two Points to 65 Per Cent

Pressure From Automobile Industry Relaxes But Prospects for Railroad Business Are Moderately Better—Another Blast Furnace Lighted

CHICAGO, Feb. 12. — Ingot output has dropped two points to 65 per cent of capacity, but specifications and new purchases of finished steel are close to the peak of the year, and it is the hope of producers that before the end of the current week all lost ground will have been regained. This drop is attributable in part to a relaxation of the pressure for steel by automobile builders, a sag in use of structural steel and to the virtual completion of rollings against recent steel piling orders.

The prospects for railroad business are moderately better and it is the hope of sellers that demand from the carriers will revive early in the spring and act as an offset to curtailment of steel consumption in other lines. Farm implement manufacturers are holding all gains and road machinery builders are soon to enter on heavy spring delivery schedules. Contrary to the drift of ingot output, pig iron production has been increased through the lighting of another steel mill stack.

Reports are being circulated here that the oil industry is to spend large sums to bring existing plants up to date. Some oil storage tanks are in these schedules, although the use for this type of equipment is not so urgent now as before the advent of the network of pipe lines.

Pig Iron

This market exhibits a steadiness that has not been shown for three or four years. Automobile foundries in western Michigan show no signs of letting down and most malleable units are well engaged. Pig iron shipments are being melted promptly and few foundries have stocks of any size. February shipments are moderately above the January rate.

Cast Iron Pipe

A few medium-sized orders are again being placed for spring delivery. This turn in business is in line with what can usually be expected at this time of year. Foundry operations have been slowed down because the bulk of shipments are moving only in the South. However, books are of fair size and the movement will be speeded as soon as contractors will accept shipments for the Northern part of the country.

Reinforcing Bars

The only pending jobs of size are tied to PWA work which is moving very slowly. It is reported that S. A. Healy Co. has been awarded the 700-ton Sanitary District project, and bars have finally been bought for the Des Moines, Iowa, post office. Many road and bridge contractors will not give up the idea that delaying bar purchases will result in their buying more cheaply. Such business as is going is being parceled out in driblets, usually of the order of 20 to 40 tons each. Fresh inquiries are light and include about 200 tons for Illinois road work, bids on which are being taken today.

Rails

Preliminary plans of the Milwaukee Road call for the purchase of 10,000 tons of rails and necessary accessories. From all other angles the market is quiet with the exception that miscellaneous track supply orders are larger, the total for the week being about 1200 tons. Neither the Burlington nor the Southern Pacific has placed its track supply tonnages, but the trade is looking for this business in the near future. Both Chicago rail mills remain inactive, though it is probable that one unit will start on a modified schedule within the next week to ten days.

Plates

Business in prospect is improved and reports are reaching Chicago that considerable sums will be spent in oil-producing centers to rehabilitate existing properties. The proposed gas line from The Panhandle section of Texas to the Central West is still a very live project. The low bidder has been announced on the 1000 tons of dredging pipe that will be used at Fort Peck, Mont. The Burlington contemplates constructing 500 composite coal cars in its own shops. About 6000 tons of steel will be required. In the meantime there is improvement in orders reaching mills from railroad repair shops.

Structural Material

The American Bridge Co. is low on 1400 tons of Illinois State bridge work, and Worden-Allen Co. has the low bid on 400 tons. The local market is very thin both in terms of awards and fresh inquiries. Fabricators are keeping an intent watch for signs of revival of dam work on the Mississippi River.

Wire Products

Production of wire mills has now reached 52 per cent of capacity, where output has leveled off under the influence of a slightly smaller demand from automobile manufacturing centers. Miscellaneous consumption of wire for manufacturing purposes is steady and jobbers are still in the market, but it now appears that they will not reach the peak of their demand until early in the second quarter. Railroads are more willing to discuss plans, but as yet are small buyers. Competition from foreign-made products remains very severe in all coastal areas.

Sheets

Cold-rolling departments continue to operate at capacity and are booked solid for the remainder of the quarter. Hot-rolled sheet departments are operating at 60 to 65 per cent of capacity. Orders are slowly increasing from the roofing trade, which is now preparing stocks for deliveries, which usually begin in April. A disposition to buy further ahead is noted in the miscellaneous trade.

Bars

Bar orders continued to lead bookings in other finished steel products. Farm implement manufacturers are running at 60 per cent of capacity and are holding all recent gains. Road machinery builders have not yet reached a real late winter stride, but are expected to do so soon inasmuch as demand for their products is expected to be heavy. Specifications from automobile centers have eased moderately.

Scrap

This market is in a trough and there are as many arguments for a weaker market as there are for one that is stronger. The fact remains that mills will not pay over $11.75 a ton for heavy melting steel and they are taking such quantities as they need on a week-to-week basis. The Chicago & Eastern Illinois has sold 1400 cars for wrecking. Scrap lists are being offered by the Wabash, the Milwaukee Road, Illinois Central, Grand Trunk and the Chicago & Western Indiana.

Demand Loses Momentum In New York District

Steel Bookings This Month Lag Behind January—Sheet Mills "Allocate" Tonnage for Second Quarter

NEW YORK, Feb. 12.—Finished steel bookings in this district in February have not kept pace with volume in the first half of January. The recession, however, is not great and may be of only passing significance. Meanwhile sheet mills, bulging with automotive commitments, are offering to make tentative allocations among customers for second quarter pending the time when contracts for that period can be written. Producers of cold-finished sheets, light hot-rolled sheets, enameling sheets, long ternes and wide cold-rolled strip steel are now pretty well sold out for the first quarter and in a number of instances of late have been forced to turn down business. There is little or no talk, in this area at least, of possible price advances. Quotations for next quarter cannot be filed, under the code, until Feb. 18, 10 days before the month preceding the contracting period.

Activity in the heavier rolled lines still lags, but construction will probably receive some added stimulus with the arrival of milder weather. Rail buying, which has been unusually light for this season, may also pick up later on, after loans have been obtained from the new $350,000,000 fund recently appropriated by Congress for railroad rehabilitation. Rolling stock purchases will also be affected, probably more than track programs.

The New York Central has placed the general contract for the third section of the West Side elevated highway, between Fifty-fourth and Sixty-fourth Streets, Manhattan, with the Corbetta Concrete Corpn., New York. Steel requirements total 1400 tons. The city of New York is taking bids on 850 tons of 48-in. steel pipe for a water line in the Bronx.

Pig Iron

Pig iron sellers had expected a decided lift in buying following the inventory period, but this condition has failed to appear. At present it is probable that new bookings will contract even further until second quarter prices are posted at the end of this month. At that time furnace representatives may be able to induce foundries to rebuild their stocks to a more normal level. Total bookings for the past seven-day period amounted to 1500 tons, as compared with 1800 tons in the preceding period and 1100 tons two weeks earlier.

Reinforcing Steel

Weather conditions have hampered highway and building construction and local sellers of bars and mesh are experiencing a very dull demand. Miscellaneous small-lot purchasing is almost negligible, and distributers have only several large projects to look forward to. Among these are 750 tons for Tri-Borough Bridge piers and 1000 tons for three sections of the West Side, Manhattan, elevated highway. Both of these tonnages should be let within the next week.

Scrap

For some time occasional lots of No. 1 and No. 2 steel have been purchased by brokers at prices above those quoted, and this action has lately become so prevalent that these grades are now 50c. higher at $9.50 and $8 a ton respectively. Stove plate, likewise, has been moved up on the strength of current purchases against export commitments. During the past week scrap has come out in better volume, and it is believed that this flow will be greatly accelerated when weather conditions improve. Local brokers are currently loading steel, stove plate, and cast iron for the four principal foreign outlets. It is known that scrap is being offered more freely abroad but the foreign price levels show some signs of weakness. An eastern Pennsylvania mill has picked up a sizable amount of No. 2 steel in Jersey City, N. J., at about $9.50 a ton, which compares with the export buying price for No. 1 steel in the same district. No. 2 steel is also being bought at a lower price for barge delivery to Sparrows Point, Md.

Rail Orders Boost Output in South

BIRMINGHAM, Feb. 12.—The Ensley rail mill of the Tennessee Coal, Iron & Railroad Co. will resume operations on Wednesday, Feb. 13, with several months' operation in prospect. This mill has done very little work since July 15. In September it was operated for three days and then again in December for 10 days.

It is estimated that present orders approximate around 50,000 tons. The St. Louis-San Francisco has bought 15,000 tons; the Louisville & Nashville, 15,000 tons; the Southern Pacific, 12,500 tons; the Central of Georgia, 3800 tons, and there are probably several other smaller orders.

The reopening of the rail mill has resulted in a sharp upturn in pig iron and steel operations. Four Tennessee company blast furnaces were put back in service last week, these being Fairfield No. 6 on Feb. 4; Ensley No. 5 and No. 6 on Feb. 6 and Ensley No. 2 on Feb. 8. The last furnace was blown in, while the other three had been banked.

These give the Tennessee company a total of five active stacks and increase the district's total to eight, as compared with four previously.

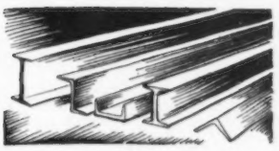
Buying in other lines of steel has also been improved in the past 10 days.

This week the Tennessee company is also firing five open-hearths at Ensley, raising its total to nine. Gulf States Steel is working three. Thus the district's total is 12 this week, as compared with seven last week and for some time previous.

Pig iron buying continues to drag. The February rate is about the same as January. There is no change in price, which is $14.50.

Pressure pipe shipments are lagging a bit. Releases are not coming as promptly as in the last quarter. The outlook for new business is still favorable and a large number of lettings are scheduled for the month.

Cleveland Output Off Two Points to 67 Per Cent



New Demand for Finished Steel Shows Moderate Decline—Makers of Sheets and Wide Strip Sold Out for the Quarter

CLEVELAND, Feb. 12.—New demand for finished steel shows a moderate decline. Automobile manufacturers and parts makers for the most part have made commitments covering their requirements through March and into April based on their stepped up production schedules, and many of the finishing mills are taxed to capacity to make deliveries called for.

In the case of sheets and wide strip the lull that has appeared in buying is attributable largely to the sold-up condition of the mills. Few makers of these products have any more tonnage available for the first quarter, and they cannot open their books for the second quarter until March 1, under the code regulations. Renewal of buying on a large scale is expected soon after that date. Some of the larger buyers of sheets in the automotive field already have asked mills to make second quarter commitments, and while formal orders are not being accepted these buyers will have their orders placed at the top of the list when the mill books are opened. This will assure the consumers a flow of steel without interruption between the winding up of the first quarter contracts and the starting of shipments against second quarter commitments.

Deliveries in two or three weeks or less can be secured on most steel products outside of sheets and wide cold-rolled strip.

Ingot output in the Cleveland-Lorain territory this week is down two points to 67 per cent of capacity, this being due to the shutting down of one open-hearth furnace for repairs.

No important price changes for the second quarter are expected. Discussion of price revisions has been confined largely to some grades of sheets.

Pig Iron

Shipments so far this month are about 25 per cent larger than during the corresponding period of January. Sales are in about the recent volume but considerably lighter than a few weeks ago when many consumers were placing contracts for the quarter. A leading producer sold 5000 tons during the week. Automobile foundries continue to take shipments in heavy volume, and some of those that placed contracts in December for the quarter are expected to need additional iron to carry them through March.

Sheets

The feverish rush of the automotive industry to get orders on the mill books has subsided somewhat. Larger consumers evidently have placed about all the sheets they will need for the remainder of the quarter and the volume of new business has declined. Consumers are devoting more attention now to securing shipments as needed and to looking after their second quarter supplies. Requests for second quarter contracts have been made by some of the larger consumers in the automotive field and, while the steel code does not allow the placing of contracts for the quarter until March 1, some of the mills have informally agreed to enter orders for regular customers as soon as their books are open. While there has been some discussion of price changes, it is expected that present prices will be reaffirmed for the coming quarter. New quotations will have to be filed Feb. 18, if books are opened March 1. While many mills have all the orders that they can fill for the remainder of this quarter, some can take a little tonnage for March shipment.

Strip Steel

New demand has tapered off somewhat, as most consumers have ordered about all the material they will need for the remainder of the quarter. While most of the mills have orders for all the wide cold-rolled strip they can produce during the remainder of the quarter, others can take a little additional tonnage for March shipment. New orders for narrow cold-rolled strip and for hot-rolled stip still can be placed fo shipment in two or three weeks.

Reinforcing Bars

Thirty-four bids were received last week by United States Engineers, Zanesville, Ohio, for 2400 tons of reinforcing bars for the six dams in connection with the Muskingum Conservancy District. One bidder made a quotation of $2 a ton under the code price but later withdrew it, claiming it was an error. Bids will go to Washington for action.

Bolts, Nuts and Rivets

Demand for bolts and nuts from automobile and agricultural implement manufacturers continues heavy, but not much business is coming from jobbers. The industry is operating at from 40 to 50 per cent of normal. Makers are talking of a slight advance for the second quarter, claiming that with increased costs they are unable to make a profit with the present discount.

Bars, Plates, and Shapes

Demand for bars from the motor car industry has become slightly less active, but miscellaneous business is well maintained. Few steel lettings and inquiries are reported. Bids for 100 tons for a second Clermont County bridge will be taken Feb. 15, by the Ohio State highway department. United States engineers will take bids Feb. 21, for the Beach City dam in connection with the Muskingum Conservancy project, requiring an unstated tonnage of fabricated steel. Bids for the relocation of railroad bridges in connection with this project and requiring 1500 tons or more of structural shapes are to be taken in a few weeks.

Iron Ore

No interest is as yet being shown in the ore market for 1935, and it is expected that it will be well along in the spring before prices are established and open market sales are made. Shipments from Lake Erie docks during January were 133,768 tons as against 81,864 tons during the same month last year. The dock balance Feb. 1 was 5,022,889 tons as compared with 5,246,278 tons on the same date a year ago.

Scrap

Absence of any new consumer demand and liberal supplies of scrap at ruling prices has resulted in an easier market tone, particularly in the Youngstown district where dealers are paying 25c. to 50c. a ton less for steel-making grades than a week ago. For delivery to Youngstown district mills dealers are offering $12.75 to $13 for No. 1 heavy melting steel as compared with $13 to $13.25 last week.

Operations in Philadelphia Area Remain at 36 Per Cent

Mill and Consumer Activity Is Apparently at a Peak; Sellers Hope for Railroad Buying — Scrap Remains Steady in Tone

PHILADELPHIA, Feb. 12.—Miscellaneous demand from small consumers is still holding its own. However most mill men here are of the opinion that this type of business has reached a maximum level and may even taper off in the near future unless heavier materials throw off their present inertia. This district must have railroad buying and activity in the construction business to maintain operations above 30 per cent for any length of time. It is quite possible that better weather conditions in the early spring will result in sufficient highway construction to lift structural steel and reinforcing bar demand from their present subnormal levels. In addition several railroads here are exhibiting more buying interest, and it is the belief that considerable tonnage may shortly go into this outlet if car loadings continue to improve.

Bethlehem's operations remain unchanged at about 41 per cent, mostly on the strength of continued demand for sheets, tin plate and spring wire. Alan Wood has taken off one open-hearth, and the Pencoyd mill is now melting steel in four furnaces. This latter plant is now running both its small and large structural mills on full schedules. The aggregate district operating rate is unchanged at 36 per cent of capacity.

The Budd Mfg. Co. has completed another stainless steel train, and two more trains of the Zephyr type as well as an additional car for the original Zephyr will be completed early in March. The Budd plant is now negotiating with a Southern railroad for the building of two more stainless steel trains.

Pig Iron

The volume of miscellaneous sales shows some improvement, but the total tonnage involved is still far from satisfactory. There is little likelihood that consumer demand will improve over the next month, as buyers are waiting for the availability of second quarter delivery before entering orders for the purpose of rebuilding stocks. Pig iron business in this area has suffered considerably from the inroads of low-price scrap, and also from the failure of foundry melt to improve in proportion to the increase in activity of other branches of industry.

Sheets and Strip

The demand for full-finished grades has about reached its peak. Local autobody stamping plants are purchasing in substantial amounts each week, although good proportions of their requirements are shipped in from the West. Consequently mills in this district do not derive the maximum benefit from the bulge in demand for autobody sheets. Stove makers are showing an increasing tendency to buy, but the demand is still very spotty and of poor volume. Whereas the market for blue-annealed sheets is very poor at present, local mills look forward to considerable improvement in March and April. At that time the underground storage tank builders usually have a seasonal bulge in activity.

Bars, Plates and Shapes

Plate sellers are utterly dependent on a small flow of miscellaneous orders, and there are no projects requiring any significant tonnage in prospect for the immediate future. This time of the year is always a slack season for bars and shapes, and the recent very severe weather has even further discouraged new building. Although no contract has yet been signed, McClintic-Marshall Corpn. will probably supply 1800 tons of structural material for buildings at the Philadelphia Navy Yard. The largest active project calls for 10,000 tons for an annex to the Library of Congress, on which bids will close March 1. An addition to the building of the German Brewing Co., Cumberland, Md., calling for 100 tons, is also still pending. Sellers of bars have sold practically no tonnage during the week. The sizable requirements of the Philadelphia Navy Yard buildings and the barracks at Carlisle, Pa., should be let within the next week.

Imports

The following iron and steel imports were received here last week: 1500 tons of chrome ore from Cuba, 30 tons of ferromanganese from France, 379 tons of pig iron from British India and 12 tons of steel tubes and 17 tons of steel forgings from Sweden.

Scrap

The steady resistance of mills to the recent upward swing in scrap prices has seemingly accomplished its purpose, at least for the time being. The market here has a weak tendency, although no actual price change has occurred in the absence of significant sales. It is the view of some observers that the dealer purchases of Bethlehem are the only factor preventing the steel price from dropping to $11.50. However Bethlehem is in a position where it has to better export offers in order to take care of its scrap requirements, which have expanded considerably in the past few weeks. Phoenixville is offering $10.25 for No. 2 steel, and Pencoyd has picked up several fair tonnages of this same grade for $10 from dealers in the immediate Philadelphia district. Otherwise the domestic market here shows no activity. At Port Richmond, export brokers are accumulating steels at $10.50 and $9.50 for a Japanese boat due in late next week.

Demand on Up Grade In Canada

TORONTO, ONT., Feb. 12.—While business gradually is showing improvement in the Canadian iron and steel markets, no large tonnage awards have been made recently. Contracts for rails and rolling stock are in abeyance, but officials of producing companies expect some action in this direction in the not distant future. The automotive industry is furnishing a steady demand for materials, and the mining branch also is furnishing a good quota of new business and several large awards are pending on this account. A number of companies have announced plans for mill construction, while others are considering this step. Building trades continue quiet with little demand for structural steel. It is understood, however, that some large construction projects are contemplated by the Federal Government.

While pig iron melters are adhering to hand-to-mouth buying, some are taking larger tonnages

than formerly and repeat orders are more frequent. Sales are running in excess of 500 tons per week. Of the 11 furnaces in Canada three are blowing, one is banked and the others are out. Production is about 1200 tons per day. Imports are restricted to small tonnage special grades from the United States. Prices are firm and unchanged.

Trading in iron and steel scrap is expanding, with current demand largely in steel grades. Price lists are firm and unchanged.

Scrap Prices Off 25c. To $1 a Ton at Detroit

DETROIT, Feb. 12.—Steel scrap prices have declined 25c. to $1 a ton in the local market. Heavy melting steel is off 50c. and hydraulic bundles $1, the latter item now being quoted for the first time in weeks at the same price as heavy melting steel, for which dealers are paying $8.50 to $9. On account of the demand from other districts, hydraulic bundles have been selling at 25c. to 50c. a ton higher than heavy melting steel. Despite heavier automobile production, the amount of scrap coming into the market is no larger than it was a few weeks ago because car manufacturers reduced scrap losses as they swung into steadier operations on current models.

Pig Iron Volume Up At Cincinnati

CINCINNATI, Feb. 12.—A slow but substantial improvement in pig iron buying has developed. While current orders, with the exceptions of one or two, are still for less than 100 tons, total bookings for the week were 800 tons. Since furnaces cannot offer any special inducements, purchases as well as inquiries are being held to requirements. Shipments of pig iron continue in good volume and very little tonnage is carried on the books. Foundries catering to automotive, stove and agricultural implement manufacturers are operating at a substantial level, but the lack of machine tool and jobbing demand is depressing average district melt. Movement of pig iron by water is almost nil.

Sheet bookings in this district are being sustained at better than 90 per cent of capacity output. Current bookings of the district mills combined with immediate prospects indicate near capacity rolling schedules for the remainder of this quarter. Automotive demand is almost 50 per cent of total bookings, but miscellaneous demand has been showing a slow but substantial expansion. The current backlog is aproximately equal to two weeks' rolling schedule.

A heavier foundry melt is reflected in an increased demand for by-product foundry coke. Ordering is still limited to 30-day needs, but the average is slightly better than last month.

The scrap market appears softer following the sale of 10,000 to 12,000 tons of miscellaneous items to a southern Ohio user at less than current quotations. Speculation among dealers is nil and buying for yard supplies is inactive. Sales of old material in small lots are more numerous, though not sufficiently large in the aggregate to affect the market trend. As a result of the softer market undertone, dealers' bids have been reduced 25c.

Sharp Gain in Bookings At St. Louis Mill

ST. LOUIS, Feb. 12.—The volume of business booked by the Granite City Steel Co. for the first five weeks in 1935 is reported to have been approximately 85 per cent ahead of the same period in 1934. Outsanding among the products responsible for the increase were galvanized sheets and hot-rolled annealed sheets, and business in tin plate has been good. It is stated that this is the first real increase in demand for the company's products since the depression that was not brought about by a threatened price advance. Buyers of the material have stipulated immediate delivery.

Mills report a good buying movement of finished iron and steel from makers of tractors and other agricultural implements and from manufacturers of washing machines. The wire products trade is extremely slow, especially when it is considered that dealers at this stage should be taking advantage of spring terms.

The PWA has allotted $1,103,000 to St. Louis for the construction of two approaches to the Municipal Bridge. The St. Louis approach will require approximately 500 tons and the East Side approach approximately 1500 tons of structural steel. H. B. Deal & Co. are the low bidders on the addition to the Homer Phillips Negro hospital, requiring 450 tons of reinforcing bars.

Shipments of pig iron for the first 10 days of February are said to have been approximately twice as large as those for the same period last year. Sales are in small lots but numerous. The stove trade is holding up fairly well.

An East Side melter has bought 5000 tons of No. 2 heavy melting steel for delivery over the next 60 days. The market is slightly easier, weakness in other markets stopping shipments of scrap from this territory. However, there is said to be no distress scrap here.

Weather Checks Scrap Exports from Boston

BOSTON, Feb. 12.—Buying of pig iron has been in scattered carlots, in the aggregate approximating 500 tons. Rice, Barton & Fales, Worcester, Mass., have not covered on their malleable inquiry, and no other round tonnages are pending. Pig iron stocks in most foundry yards are small, and will have to be replenished on short notice when conditions warrant. Connecticut foundries collectively appear to be more active than those in other New England States, but the industry as a whole is not operating at more than 30 per cent of rated capacity.

Scrap exports are still hampered by snow, ice and a lack of steamer space. Exporters, however, have sizeable backlog orders and are trying to cover their needs. Prices for practically all materials both for domestic and export delivery are holding. There has been considerable talk of lower prices on chemical borings, but brokers continue to pay former quotations. For the first time in many months there is a demand for mixed borings and turnings for Pittsburgh delivery at $1.50 a ton, f.o.b., but with available supplies frozen and the cost of loading what it is, little material has been moved.

Cast iron pipe is quieter than it has been in years. Even sales of carlots can be counted on the fingers of one hand.

The Jones & Laughlin Steel Corpn. is planning construction of a blooming mill to cost approximately $4,000,000 at its South Side, Pittsburgh, works. The proposed structure and equipment are part of a modernization program that had been planned by the company prior to the depression, but is not intended to increase productive capacity or affect the number of employees.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh		1.80c.
F.o.b. Chicago		1.85c.
F.o.b. Gary		1.85c.
F.o.b. Duluth		1.95c.
Del'd Detroit		1.95c.
F.o.b. Cleveland		1.85c.
F.o.b. Buffalo		1.90c.
Del'd Philadelphia		2.09c.
Del'd New York		2.13c.
F.o.b. Birmingham		1.95c.
F.o.b. cars dock Gulf ports		2.20c.
F.o.b. cars dock Pacific ports		2.35c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts

	Base per Net Ton
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.985c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.985c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.005c.
Del'd New York	2.0525c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24 f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate

Per Base Box

Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

	To Manufacturing Trade	*Per Lb.*
Bright wire		2.30c.
Spring wire		2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

	Base per 100 Lb.
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh. On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

	Off List
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.	*Wrought Iron* Inches	Black	Galv.
⅛	51½	29½	⅛	+91½	+138
¼ to ⅜	53½	35	¼ & ⅜	+1½	+21½
½	58½	47	½	31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft. 5 %
10,000 lb. or ft. to 24,999 lb. or ft. 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. 25 %
Under 2,000 lb. or ft. 40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1½ in o.d.	13 B.W.G.	$ 9.72
1¾ in. o.d.	13 B.W.G.	11.06
2 in. o.d.	13 B.W.G.	12.38
2¼ in. o.d.	13 B.W.G.	13.79
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.56
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.66
4½ in. o.d.	10 B.W.G.	35.22
5 in. o.d.	9 B.W.G.	44.25
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:

40,000 lb. or ft. base
25,000 lb. or ft. to 39,999 lb. or ft. plus 5%
10,000 lb. or ft. to 24,999 lb. or ft. plus 12½%
2,000 lb. or ft. to 9,999 lb. or ft. plus 25 %
Under 2,000 lb. or ft. plus 40 %

CHARCOAL IRON BOILER TUBES

Base Discounts, f.o.b. Pittsburgh

In. O. D.	
1½ and 1¾	44
2 —2¼	13 and 10
2½—2¾	16 and 10
3	17 and 10
3¼—3½	18 and 10
4	20 and 10
4½, 5, 6	21 and 10

Extras for quantity: For 1½ to 1¾, up 8 points under 10,000 lb., up 4 points 10,000 lb. to carload. For 2 in. to 5½ in., up 2 points without supplementary 10 per cent, under 10,000 lb.; supplementary 5 per cent instead of supplementary 10 per cent for 10,000 lb. to carload.

In sizes 2 in. to 4½ in. O.D. inclusive, all tubes more than four gages heavier than standard are priced per lb. as follows: Carload and over, 9c.; extras for quantity—under 10,000 lb. 1c. per lb., 10,000 lb. to carload ½c. per lb.

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$47.00
*4-in., del'd Chicago	50.00
6-in. and larger, del'd New York	45.00
4-in. del'd New York	48.00
*6-in. and larger, Birmingham	39.00
*4-in. Birmingham	42.00

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $38, Birminghom, and $46, delivered Chicago, and 4-in pipe $41, Birmingham, and $49 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.55
Track bolts, no jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70, 10 and 10
Carriage bolts	70, 10 and 10
Lag bolts	70, 10 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	70, 10 and 10
Hot-pressed nuts, blank or tapped, square	70, 10 and 10
Hot-pressed nuts, blank or tapped, hexagons	70, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10 and 10
Semi-finished hexagon nuts, U.S.S. all sizes	70, 10 and 10
Semi-finished hexagon nuts, S.A.E. ¼ in. to 7/16 in. diameter	70, 10 and 10
½ in. to 1 in. diameter	70, 10 and 10
larger than 1 in. diameter	70, 10 and 10
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, P'gh.	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60 and 10

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10 to 80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.45c.
Delivered price at Detroit is.....2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)
(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	22c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped .....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	32.00

Delivered Detroit

Rerolling	$30.00
Forging	35.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	34.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J. From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind. From Chicago	20.55	20.55	....	....
Milwaukee From Chicago	19.50	19.50	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.26	20.26	....	....
Kansas City From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti. 6 to 8% C. f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.00 to	$13.50
No. 2 heavy melting steel	12.00 to	12.50
No. 2 railroad wrought	13.00 to	13.50
Scrap rails	14.00 to	14.50
Rails 3 ft. and under	14.50 to	15.00
Compressed sheet steel	12.75 to	13.25
Hand bundled sheet steel	**12.00 to**	**12.50**
Hvy. steel axle turnings	10.50 to	11.00
Machine shop turnings	9.00 to	9.50
Short shov. turnings	9.00 to	9.50
Short mixed borings and turnings	6.75 to	7.25
Cast iron borings	6.75 to	7.25
Cast iron carwheels	12.75 to	13.25
Heavy breakable cast	12.25 to	12.75
No. 1 cast	13.50 to	14.00
Railr. knuckles and couplers	15.00 to	15.50
Rail, coil and leaf springs	15.00 to	15.50
Rolled steel wheels	15.00 to	15.50
Low phos. billet crops	15.00 to	15.50
Low phos. sheet bar crops	15.00 to	15.50
Low phos. plate scrap	14.00 to	14.50
Low phos. punchings	14.00 to	14.50
Steel car axles	15.00 to	15.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton	
Heavy melting steel	$11.25 to	$11.75
Automobile hvy. melt. steel	11.00 to	11.50
Shoveling steel	11.25 to	11.75
Hydraulic comp. sheets	**10.50 to**	**11.00**
Drop forge flashings	9.75 to	10.25
No. 1 busheling	9.50 to	10.00
Rolled carwheels	12.00 to	12.50
Railroad tires	12.50 to	13.00
Railroad leaf springs	12.00 to	12.50
Axle turnings	10.00 to	10.50
Steel couplers and knuckles	12.00 to	12.50
Coil springs	12.50 to	13.00
Axle turnings (elec. fur.)	11.00 to	11.50
Low phos. punchings	12.50 to	13.00
Low phos. plates, 12 in. and under	13.75 to	14.25
Cast iron borings	7.00 to	7.50
Short shoveling turnings	**7.00 to**	**7.50**
Machine shop turnings	6.00 to	6.50
Rerolling rails	12.50 to	13.00
Steel rails, less than 3 ft.	13.25 to	13.75
Steel rails, less than 2 ft.	14.00 to	14.50
Angle bars, steel	12.50 to	13.00
Cast iron carwheels	12.00 to	12.50
Railroad malleable	12.50 to	13.00
Agricultural malleable	9.50 to	10.00

Per Net Ton

Iron car axles	$15.50 to	$16.00
Steel car axles	15.25 to	15.75
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	10.00 to	10.50
No. 2 busheling	**5.50 to**	**6.00**
Locomotive tires, smooth	10.00 to	10.50
Pipe and flues	5.50 to	6.00
No. 1 machinery cast	10.00 to	10.50
Clean automobile cast	9.50 to	10.00
No. 1 railroad cast	9.50 to	10.00
No. 1 agricultural cast	9.00 to	9.50
Stove plate	6.50 to	7.00
Grate bars	6.50 to	7.00
Brake shoes	7.00 to	7.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting steel	10.00 to	10.50
No. 1 railroad wrought	11.00 to	11.50
Bundled sheets	9.50 to	10.00
Hydraulic compressed, new	11.00 to	11.50
Hydraulic compressed, old	7.50 to	8.00
Machine shop turnings	**6.50 to**	**7.00**
Heavy axle turnings	**8.50 to**	**9.00**
Cast borings	**5.00 to**	**5.50**
Heavy breakable cast	10.50 to	11.00
Stove plate (steel works)	8.50 to	9.00
No. 1 low phos. heavy	15.00 to	15.50
Couplers and knuckles	14.50 to	15.00
Rolled steel wheels	14.50 to	15.00
No. 1 blast furnace	**5.00 to**	**5.50**
Spec. iron and steel pipe	8.00 to	8.50
Shafting	17.00 to	17.50
Steel axles	16.50 to	17.00
No. 1 forge fire	9.50 to	10.00
Cast iron car wheels	12.25 to	12.75
No. 1 cast	**11.00 to**	**11.50**
Cast borings (chem.)	**12.00 to**	**14.00**
Steel rails for rolling	12.00 to	12.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$8.75 to	$9.25
Scrap rails for melting	8.75 to	9.25
Loose sheet clippings	5.25 to	5.75
Bundled sheets	6.75 to	7.25
Cast iron borings	5.25 to	5.75
Machine shop turnings	5.25 to	5.75
No. 1 busheling	6.75 to	7.25
No. 2 busheling	3.50 to	4.00
Rails for rolling	9.75 to	10.25
No. 1 locomotive tires	8.00 to	8.50
Short rails	12.25 to	12.75
Cast iron carwheels	8.75 to	9.25
No. 1 machinery cast	10.00 to	10.50
No. 1 railroad cast	9.25 to	9.75
Burnt cast	6.75 to	7.25
Stove plate	6.75 to	7.25
Agricultural malleable	8.75 to	9.25
Railroad malleable	9.75 to	10.25

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.00 to	$11.50
No. 2 heavy melting steel	10.50 to	11.00
Compressed sheet steel	10.50 to	11.00
Light bundled sheet stampings	8.50 to	9.00
Drop forge flashings	10.00 to	10.50
Machine shop turnings	8.00 to	8.50
Short shoveling turnings	8.00 to	8.50
No. 1 busheling	9.50 to	10.00
Steel axle turnings	9.50 to	10.00
Low phos. billet crops	14.50 to	15.00
Cast iron borings	8.00 to	8.50
Mixed borings and short turnings	8.00 to	8.50
No. 2 busheling	8.00 to	8.50
No. 1 cast	12.50 to	13.00
Railroad grate bars	7.00 to	7.50
Stove plate	8.00 to	8.50
Rails under 3 ft.	15.00 to	15.50
Rails for rolling	15.50 to	18.00
Railroad malleable	13.00 to	13.50
Cast iron carwheels	....	12.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers plants:

No. 1 heavy melting steel	$12.50 to	$13.00
No. 2 heavy melting scrap	11.50 to	12.00
Scrap rails	12.00 to	12.50
New hydraul. comp. sheets	11.50 to	12.00
Old hydraul. comp. sheets	10.00 to	10.50
Drop forge flashings	11.50 to	12.00
No. 1 busheling	11.50 to	12.00
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	....	6.25
Knuckles and couplers	13.50 to	14.00
Coil and leaf springs	13.50 to	14.00
Rolled steel wheels	13.50 to	14.00
Low phos. billet crops	13.75 to	14.25
Short shov. steel turnings	7.25 to	7.50
Short mixed borings and turnings	7.25 to	7.50
Cast iron borings	7.25 to	7.50
No. 2 busheling	7.50 to	8.00
Steel car axles	13.50 to	14.00
Iron axles	13.50 to	14.00
No. 1 machinery cast	12.00 to	12.50
No. 1 cupola cast	10.50 to	11.00
Stove plate	10.00 to	10.50
Steel rails, 3 ft. and under	14.00 to	14.50
Cast iron carwheels	11.50 to	12.00
Industrial malleable	12.50 to	13.00
Railroad malleable	12.50 to	13.00
Chemical borings	8.50 to	9.00

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$9.00 to	$9.25
No. 1 heavy melting steel	7.00 to	7.25
Scrap T rails	7.75 to	8.00
*No. 2 steel	8.25 to	8.50
No. 2 steel	6.00 to	6.50
Breakable cast	6.00 to	6.50
Machine shop turnings	3.00 to	3.25
Bundled skeleton, long	6.00 to	6.20
Forge flashings	6.00 to	6.20
Mixed borings and turnings	....	1.50
Shafting	11.50 to	12.00
Steel car axles	11.50 to	12.00
Cast iron borings, chemical	6.50 to	7.00
Stove plate	4.00 to	4.25

Per gross ton delivered consumers' yards:

Textile cast	$9.00 to	$9.50
No. 1 machinery cast	9.00 to	9.50
Stove plate	6.00 to	6.50
Railroad malleable	11.00 to	11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$8.50 to	†$9.50
No. 2 heavy melting steel	*7.50 to	†8.00
Heavy breakable cast	6.75 to	7.25
No. 1 machinery cast	7.50 to	8.00
No. 2 cast	6.50 to	7.00
Stove plate	6.00 to	6.50
Steel car axles	12.50 to	13.00
No. 1 railroad wrought	7.50 to	8.00
No. 1 yard wrought, long	6.50 to	7.00
Spec. iron and steel pipe	4.50 to	5.00
Forge fire	5.50 to	6.00
Rails for rolling	9.00 to	9.50
Short shoveling turnings	2.50 to	3.00
Machine shop turnings	2.50 to	3.00
Cast borings	3.50 to	3.75
No. 1 blast furnace	2.00 to	2.50
Cast borings (chemical)	11.00 to	11.50
Unprepared yard iron and steel	4.50 to	5.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.00 to	$9.50
Scrap steel rails	10.00 to	10.50
Short shoveling turnings	....	7.00
Stove plates	....	7.00
Steel axles	....	11.50
Iron axles	....	11.50
No. 1 railroad wrought	....	7.00
Rails for rolling	....	12.50
No. 1 cast	9.50 to	10.00
Tramcar wheels	....	10.00
Cast iron borings, chem.	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$9.25 to	$9.75
No. 1 heavy melting	8.50 to	9.00
No. 2 heavy melting	7.50 to	8.00
No. 1 locomotive tires	9.75 to	10.25
Misc. stand-sec. rails	10.00 to	10.50
Railroad springs	11.00 to	11.50
Bundled sheets	6.00 to	6.50
No. 2 railroad wrought	9.25 to	9.75
No. 1 busheling	5.00 to	5.50
Cast iron borings and shoveling turnings	4.00 to	4.50
Rails for rolling	11.00 to	11.50
Machine shop turnings	4.00 to	4.50
Heavy turnings	5.50 to	6.00
Steel car axles	13.50 to	14.00
Iron car axles	15.00 to	16.00
No. 1 railroad wrought	7.50 to	8.00
Steel rails less than 3 ft.	11.75 to	12.25
Steel angle bars	9.50 to	10.00
Cast iron carwheels	8.25 to	9.25
No. 1 machinery cast	9.00 to	9.50
Railroad malleable	10.00 to	10.50
No. 1 railroad cast	9.00 to	9.50
Stove plate	6.50 to	7.00
Agricult. malleable	8.50 to	9.00

DETROIT

Dealers' buying prices per gross ton

Heavy melting steel	$8.50 to	$9.00
Borings and short turnings	5.00 to	5.50
Long turnings	$4.50 to	$5.00
No. 1 machinery cast	10.50 to	11.00
Automotive cast	10.75 to	11.25
Hydraul. comp. sheets	8.50 to	9.00
Stove plate	6.50 to	7.00
New factory busheling	7.50 to	8.00
Old No. 2 busheling	4.50 to	5.00
Sheet clippings	6.00 to	6.50
Flashings	8.00 to	8.50
Low phos. plate scrap	8.75 to	9.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$7.00	$7.00
Rails scrap	8.00	8.00
Machine shop turnings	3.00	3.00
Boiler plate	4.50	4.50
Heavy axle turnings	4.50	4.00
Cast borings	4.00	3.50
Steel borings	2.00	2.00
Wrought pipe	3.50	3.50
Steel axles	7.00	8.00
Axles, wrought iron	7.00	8.00
No. 1 machinery cast	9.00	9.00
Stove plate	5.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.50
Tungsten, domestic scheelite, delivered†	17.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

Per Net Ton

Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$15.50 to $16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton

Furnace, f.o.b. Connellsville Prompt	$3.85
Foundry, f.o.b. Connellsville Prompt	$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.00c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

Per Net Ton

Standard size	$45.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

Per Net Ton

Standard size, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count,	65 per cent off list.
Machine bolts, 100 count,	65 per cent off list.
Carriage bolts, 100 count,	65 per cent off list.
Nuts, all styles, 100 count,	65 per cent off list.
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.20c.
Soft steel bars	2.95c.
Cold-fin. steel bars:	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.

Per Cent Off List

Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05
Cement c't'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK

Base per Lb

Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, small shapes	3.22c.
Iron bars	3.22c.
Iron bars, swed. charcoal	6.75c. to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-rolled; strip, soft and quarter hard	3.32c.
Hoops	3.52c.
Bands	3.52c.
Hot-rolled sheets (No. 10)	3.27c.
Hot-rolled ann'l'd sheets (No. 24*)	3.85c.
Galvanized sheets (No. 24*)	4.50c.
Long terne sheets (No. 24)	5.20c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.25c.
Wire, galv. (No. 10)	3.85c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21

	Per Cent
Machine bolts, cut thread:	Off List
All diameters	70
Carriage bolts, cut thread:	
All diameters	70

Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.44c.
Bars, soft steel or iron	3.19c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	4.09c.
Galv. sheets (No. 24)	4.79c.
Hot-rolled sheets (No. 10)	3.29c.
Black corrug. sheets (No. 24)	4.09c.
*Galv. corrug. sheets	4.79c.
Structural rivets	3.99c.
Boiler rivets	4.09c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
1000 lb. or over	70 and 10
200 to 999 lb.	67½ and 10
100 to 199 lb.	65 and 10
Less than 100 lb.	60 and 10

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.95c.
*Structural shapes	2.95c.
*Soft steel bars, small shapes, iron bars (except bands)	2.90c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.75c.
*Steel hoops	3.40c.
*Steel bands, No. 12 and 3/16 in., incl.	3.15c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.55c.
†Galvanized sheets (No. 24)	4.25c.
*Hot-rolled annealed sheets (No. 10)	3.05c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.31c.
Soft steel bars	2.95c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.
†Outside delivery 10c. less.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.15c.
New billet reinforc. bars	3.25c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.45c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.00c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.91
Com. wire nails, base per keg (1 to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c't'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35

	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

BUFFALO

Base per Lb.

Plates	3.37c.
Struc. shapes	3.25c.
Soft steel bars	3.00c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.62c.
Galv. sheets (No. 24)	4.70c.
Bands	3.42c.
Hoops	3.42c.
Hot-rolled unannealed sheets	3.17c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb.	3.55

BOSTON

Per Lb. Base

Beams, channels, angles, tees, zees	3.52c.
H beams and shapes	3.52c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.53c.
Floor plates, diamond pattern	5.33c.
Bar and bar shapes (mild steel)	3.30c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.60c. to 4.60c.
Half rounds, half ovals, ovals and bevels	4.55c.
Tire steel	4.55c.
Cold-finished rounds and hexagons	5.25c.
Cold-rolled strip steel	3.245c.
Cold-finished squares and flats	4.30c.
Blue annealed sheets, No. 10 gal.	3.60c.
One pass cold-rolled sheets No. 24 ga.	4.15c.
Galvanized steel sheets, No. 24 ga.	4.85c.
Lead coated sheets, No. 24 ga.	5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

MILWAUKEE

Base per Lb.

Plates and structural shapes	3.31c.
Soft steel bars	3.06c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No 24)	4.66c.
Cold-finished steel bars	4.36c.
Cold-rolled strip	3.30c.
Structural rivets (keg lots)	3.86c.
Boiler rivets (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.10c.
Com. wire nails	2.90c.
Cement coated nails	2.90c.

Per Cent Off List

Machine bolts (100 pcs. and over)	65
Carriage bolts (100 pcs. and over)	65
Hot-pressed nuts, sq. and hex., tapped or blank (keg lots)	60 and 5

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.60c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.45c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel:			
Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg	$3.40	$3.25	$3.30

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

Base per Lb.

High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

A. F. of L. Unionization Plans for Steel Now Being Made

WASHINGTON, Feb. 12—Plans of the executive council of the American Federation of Labor to launch a new campaign of unionization in the steel industry are expected to be made this week. The Council, according to President Green, of the federation, will discuss the entire steel situation and it is reported to be proposing to organize federal unions.

Whatever force there may be back of this movement, it is given much more significance here than that given the demands of the radicals suspended from the Amalgamated Association of Iron, Steel and Tin Workers. This wing, led by William J. Spang, was rebuffed by the executive council yesterday when it sought to lay these demands before it. Upon receipt of a telegram from President Mike F. Tighe of the Amalgamated to President Green, the Spang delegation was received by Mr. Green, who, in an effort to mollify the delegation, told it that the executive council was giving "special consideration" to the steel labor situation. He advised the delegation also that the Amalgamated workers should settle their troubles among themselves. The Spang crowd bitterly assailed Mr. Tighe and it is doubted that such a settlement can be reached. Rather, the break within the Amalgamated ranks seems to be definite.

Meanwhile, the executive council plan of federal unions in the steel industry apparently would mean that the Amalgamated association would either be absorbed by them, or the so-called "one big steel union" would take direct control under the auspices of the American Federation of Labor.

The steel labor situation is said to have been discussed by federation officials with President Roosevelt yesterday as the latter sought to heal their breach with the White House over the extension of the automobile code without granting any of labor's demands. However, no statement was given out about it.

Tin Quotations Break Sharply at London—Sales Here Very Light

Copper Demand Well Sustained—Buying of Lead Continues Active With Quotations Strong—No Change in January Zinc Production

NEW YORK, Feb. 11.—In view of the holiday tomorrow, the market here has been rather quiet, and sales were probably considerably below the recent average. The month's transactions through Saturday amounted to 9600 tons, a considerable improvement over the corresponding January figure. The Blue Eagle price remains firm at 9c. a lb., Connecticut Valley, and the foreign market on electrolytic is somewhat stronger following the completion of recent heavy liquidation. The closing price today was 6.70c. a lb., usual Continental base ports, after an opening of 6.65c. a lb. Copper consumption still seems to be rising, but unsettlement over the gold clause decision is still an important market factor.

Tin

A rather sharp break in prices at London today was naturally reflected in the New York tin market, and it was rather late in the afternoon before quotations here were even partially established at about 50.75c. a lb. for spot Straits metal. This represented a decline of 35 points from Friday's quotation and was not so severe as the drop abroad. The break at London was probably brought about by the uncertainty in all markets there which was occasioned by the failure of certain pepper houses. At the closing session in London today, spot standard was quotable at £229 15s. and futures at £226 15s. Spot straits was available at £230 10s., while the eastern price was off only slightly to £231 5s.

Lead

This market remains strong and moderately active at recent quotations of 3.50c. a lb., New York, and 3.35c., St. Louis. One large seller is still asking a premium of $1 a ton on eastern business and is taking a fair number of orders at the higher level. In some cases sellers are deferring commitments at current prices, and the volume of recent buying indicates a price advance before the end of the week. The lead ore market is rather weak, with prices on Saturday having been $32 a ton for carlots and $30 and $31 for smaller quantities.

Zinc

Demand for zinc is still dull, but quotations are unchanged at 4.05c. a lb., New York, and 3.70c., East St. Louis. Reports of shading cannot be verified, but the market can hardly be considered strong. January statistics had no effect on the market, although a decline of nearly 5000 tons in unfilled orders led to the belief that increases in commitments might be forthcoming. January production, at 35,614 tons, showed scarcely any change from December figure of 35,685 tons, although shipments increased from 31,707 tons to 35,538 tons. The Prime Western Zinc Producers Committee of the American Zinc Institute, Inc., reports that member companies sold 5265 tons of Prime Western in January for delivery that month, at a weighted average selling price of 3.736c. a lb. For subsequent delivery, they sold 5152 tons of Prime Western at a weighted average price of 3.737c. a lb., East St. Louis. Zinc ore production continues high, output last week having amounted to 8600 tons. Sales totaled 6800 tons, and shipments, 7850 tons.

Ingot Brass and Bronze

The Non-Ferrous Ingot Metal Institute reports that the combined shipments and deliveries of ingot brass and bronze made during December by 39 companies engaged in the industry were 3688 tons.

Non-Ferrous Averages

The average prices of the major non-ferrous metals for January, based on daily quotations in THE IRON AGE, are as follows:

	Average
Electrolytic copper, N. Y.*‡	8.75c. a lb.
Lake copper, Eastern delivery*	9.12½c. a lb.
Straits tin, Spot, N. Y.	50.90½c. a lb.
Zinc, East St. Louis	3.73c. a lb.
Zinc, New York	4.08c. a lb.
Lead, St. Louis	3.54c. a lb.
Lead, New York	3.69c. a lb.

*Blue Eagle copper. ‡Price ¼c. higher in Connecticut Valley.

The Week's Prices. Cents Per Pound for Early Delivery

	Feb. 6	Feb. 7	Feb. 8	Feb. 9	Feb. 11	Feb. 12
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	...
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	...
Straits tin, Spot, New York	51.15	51.20	51.10	...	50.75	...
Zinc, East St. Louis	3.70	3.70	3.70	3.70	3.70	...
Zinc, New York	4.05	4.05	4.05	4.05	4.05	...
Lead, St. Louis	3.35	3.35	3.35	3.35	3.35	...
Lead, New York	3.50	3.50	3.50	3.50	3.50	...

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 14.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.25c. to 53.25c.
Tin, bar	54.25c. to 55.25c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.25c.
Tin, bar	56.25c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slabs	5.50c. to 5.75c.
Lead, American pig	4.50c. to 4.75c.
Lead, bar	7.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	59.50c.
Solder, ½ and ½	33.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.37½c.	6.12½c.
Copper, hvy. and wire	5.25c.	5.75c.
Copper, light and bottoms	4.25c.	4.75c.
Brass, heavy	2.75c.	3.37½c.
Brass, light	2.00c.	2.75c.
Hvy. machine composition	4.37½c.	4.87½c.
No. 1 yel. brass turnings	3.62½c.	4.12½c.
No. 1 red brass or compos. turnings	3.87½c.	4.37½c.
Lead, heavy	2.62½c.	3.00c.
Zinc	1.87½c.	2.25c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Pipe Lines

Quartermaster Depot, 1819 West Pershing Road, Chicago, asks bids until Feb. 27 for 10,200 lin. ft. of 2½-in. butt weld steel pipe (Circular 179).

Sultan, Wash., plans steel pipe line for main water system. Fund of $20,000 has been arranged for this and other water works extensions. Clarence Hickey is engineer.

Lavaca Gas Co., Port Lavaca, Tex., Frank M. Dudgeon, head, recently organized, has secured local franchise for commercial gas supply and plans about four miles of welded steel pipe for main natural gas supply, and about 20,000 ft. of 4 to 8-in. welded lines for distribution system. Cost about $75,000.

Thurston, Neb., is considering installation of steel pipe lines for natural gas distribution.

Superintendent of Construction, Indian Service, Billings, Mont., closes bids Feb. 15 for galvanized steel pipe; also wrought iron and cast iron, for service at Red Lake, Minn.

State of Texas, represented by R. B. Anderson, State House, Austin, State tax commissioner, is arranging a State Natural Gas Authority, with approval of PWA, to build a welded steel pipe line from Texas Panhandle gas fields to points near St. Louis and Detroit, where distribution would be handled by these and other municipalities desiring supply. First part of project will include line to first noted city, estimated to cost $30,000,000, to be followed by other trunk line to Detroit, to cost about $20,000,000. Financing will be arranged through Federal aid.

Escanaba, Mich., plans extensions in municipal gas steel pipe lines. A. F. Aaronson is city engineer.

Cast Iron Pipe

Tappahannock, Va., plans water pipe line system. Fund of $27,000 being arranged for this and other waterworks construction.

Ogallala, Neb., asks bids until Feb. 18 for 3400 ft. of 6-in. for water supply; also for quantity of fittings.

Oil City, Pa., plans 12-in. line from water pumping station to Hasson Heights district for high-pressure service; also other distribution mains and several storage tanks. B. B. Weber is city engineer.

Gnadenhutten, Ohio, will soon take bids for water pipe lines and other waterworks installation. Fund of $49,000 has been arranged. Arnold, Rosch & Hartlein, New Philadelphia, Ohio, are consulting engineers.

Deland, Ill., has placed 150 tons with James B. Clow & Sons.

Monette, Ark., plans water pipe line system for which bids will be asked soon. Fred Jackson, mayor, is in charge.

Deepwater, Mo., plans water pipe lines and other waterworks and sewage construction. Fund of $60,000 is being arranged for entire project. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Oakland City, Ind., plans water pipe line system. Fund of $50,000 is being arranged. State Planning Commission, State House, Indianapolis, has approved plans.

Duluth, Minn., has placed 130 tons with James B. Clow & Sons.

McIntosh, Minn., has awarded 5000 ft. of 4 and 6-in. to James B. Clow & Sons.

Stratford, Wis., closes bids Feb. 28 for new water supply, including 4000 lin. ft. of 8-in. Frank Curtin is village clerk.

Daytona Beach, Fla., plans water pipe lines. Fund of $385,000 is being arranged for this and other waterworks construction. Robert & Co., Inc., Bona Allen Building, Atlanta, Ga., is consulting engineer.

Winnemucca, Nev., plans water pipe lines and other waterworks and municipal improvements. Bond issue of $306,000 has been approved.

Sweetwater, Tex., let contract to American Cast Iron Pipe Co. for pipe and fittings for water system at $83,950.

Bland, Mo., rejected bids recently received for water pipe lines and will soon ask new bids. George E. Wells, Inc., Security Building, St. Louis, is consulting engineer.

Nelscott-DeLake Water District, Nelscott, Ore., care of H. M. Branson, Salem, Ore., consulting engineer, plans water pipe lines in district, including main 6-mile supply line from Erickson Creek. Fund of $35,000 is being arranged.

Tillamook, Ore., plans pipe lines for water supply. Fund of $59,000 has been authorized for this and other waterworks installation.

Redwood City, Cal., has awarded 347 tons of 10 and 12-in. to United States Pipe & Foundry Co.

Monroe, Utah, will take bids Feb. 20 on 268 tons of 2 to 8-in.

Kanab, Utah, will take bids Feb. 19 on 4 and 6-in. J. R. Sutherland, Richfield, Utah, is engineer.

Levan, Utah, has set Feb. 21 as tentative date for opening bids on 304 tons of 2 to 8-in.

Koosharem, Utah, will take bids Feb. 20 on 123 tons of 2 and 4-in.

Bloomington, Idaho, has been allotted $34,000 by PWA for water system improvements, which include 158 tons.

Ekalaka, Mont., will open bids Feb. 25 on 133 tons of 4 and 6-in.

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Manufacturers of

COLD DRAWN STEELS

Turned and Polished Shafting, Turned and Ground Shafting

A NEWARK WAREHOUSE

Will be opened this month at 332 Frelinghuysen Avenue, Newark, New Jersey. Stocks of Hy-ten, Economo, & S.A.E. Steels will be available for immediate shipment to users of alloy and special steels in that district. More detailed information will be circularized to the trade.

WHEELOCK, LOVEJOY & COMPANY, INC.

CAMBRIDGE CHICAGO CLEVELAND DETROIT NEWARK

Fabricated Structural Steel

Lettings Decline—New Projects Also Lower

WITH bookings aggregating 9655 tons, the two largest awards are 1800 tons for Navy Yard buildings at Philadelphia and 1390 tons for a bridge in St. Clair County, Ill. New projects of 5800 tons compare with 16,150 tons in the previous week and 9400 tons two weeks ago. The bulk of inquiries is for public work and includes 2000 tons for two approaches to a municipal bridge at St. Louis. Other new jobs call for small tonnages. Plate awards total 1130 tons, with 2250 tons pending. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Rutland, Vt., 100 tons, bridge, to American Bridge Co.

Boston, 340 tons, United Drug Co. building, to Rogers Steel Co.

Albany, N. Y., 165 tons, college dormitory buildings, to Smith & Caffrey Co.

New York, 590 tons, Fordham University buildings, to Bethlehem Fabricators, Inc.

Queens, New York, 730 tons, School No. 146, to American Bridge Co.

Pennsylvania Railroad, 200 tons, transfer bridge to New York City, to National Bridge Works.

Bordentown, N. J., 330 tons, housing for prisoners, to American Bridge Co.

Collegeville, Pa., 230 tons, State highway bridge, to American Bridge Co.

SOUTH AND SOUTHWEST

Big Stone Gap, Va., 180 tons, State highway bridge, to Virginia Bridge & Iron Co.

Richmond, Va., 135 tons, railroad bridge, to Jones & Laughlin Steel Corpn.

Hanover County, Va., 100 tons, bridge, to Virginia Bridge & Iron Co.

Philadelphia, 1800 tons, Philadelphia Navy Yard buildings, to McClintic-Marshall Corpn.

Monroe, La., 120 tons, overpass, to Jones & Laughlin Steel Corpn.

Morgan City, La., 370 tons, overpass, to Jones & Laughlin Steel Corpn.

Upshur County, Tex., 145 tons, bridge, to Austin Brothers Bridge Co.

Turpin, Okla., 375 tons, bridge, to J. B. Klein Iron & Foundry Co.

CENTRAL STATES

St. Clair County, Ill., 1390 tons, highway bridge, to American Bridge Co.

Macoupin County, Ill., 255 tons, highway bridge, to Clinton Bridge Co.

Washington County, Ill., 405 tons, highway bridge, to Worden-Allen Co.

Red Cedar, Wis., 300 tons, State highway bridge, to McClintic-Marshall Corpn.

Jasper County, Iowa, 240 tons, bridge spans, to Pittsburgh-Des Moines Steel Co.

Polk County, Mo., 125 tons, bridge, to Kansas City Structural Steel Co.

Grant County, Kan., 145 tons, bridge, to George A. Cristopher & Son, Inc.

State of Nebraska, 125 tons, bridge, to Omaha Steel Works.

WESTERN STATES

Santa Ana, Cal., 250 tons, block "A" at Santa Ana high school, to Pacific Coast Steel Corpn.

Los Angeles, 160 tons, switch rack for Department of Water and Power, to Emsco Derrick & Equipment Co.

Long Beach, Cal., 250 tons, Hamilton junior high school, to Consolidated Steel Corpn.

SOUTH AMERICA

Santos, Brazil, 200 tons, building, to Muskogee Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Rumford, Me., 350 tons, State bridge.

Brooklyn, 500 tons, bridge over Wallabout Canal.

Pittsburgh & Lake Erie Railroad, 200 tons, canopy shed at Pittsburgh.

Waynesboro, Pa., unstated tonnage, post office; bids due Feb. 21.

Shenandoah, Pa., unstated tonnage, post office; Seymour Ruff & Sons, Inc., low bidder.

Washington, unstated tonnage, sewage disposal plant; first unit due on March 1, eight additional units to be bid.

SOUTHWEST

State of Oklahoma, 580 tons, four highway bridges.

CENTRAL STATES

State of Ohio, 100 tons, Clermont County bridge; bids Feb. 15.

Struthers, Ohio, 258 tons, highway bridge for Mahoning County; Lackawanna Structural Steel Co. low bidder.

Troy, Ohio, 330 tons, building for Gummed Products Co.; Gillmore, Carmichael & Olson Co., Cleveland, general contractor.

Chicago, 200 tons, school.

Crossville, Ill., 100 tons, bridge.

East St. Louis, Ill., 450 tons, State highway bridge.

St. Louis, 2000 tons, two approaches to municipal bridge, PWA grant of $1,103,000 allotted.

State of Nebraska, 225 tons, bridges.

WESTERN STATES

Boulder City, Nev., 150 tons, gates, Minneapolis-Moline Power Implement Co. reported as low bidder.

Boulder City, 200 tons, gantry crane, Specifications 662-D; bids Feb. 20.

Grand County, Colo., 143 tons, State highway bridge west of Granby; bids Feb. 18.

Long Beach, Cal., 107 tons, Burnett school; bids soon.

Southern Pacific Railroad, 360 tons, bridge at San Francisco.

Almira, Wash., 250 tons, gantry crane and hoist, Specification 664-D; bids to be taken at Denver, Feb. 26.

FABRICATED PLATE

AWARDS

Fort Peck, Mont., 1130 tons, 28-in. pipe, to Treadwell Construction Co.

NEW PROJECTS

Bronx, New York, 850 tons, for 48-in. municipal pipe line.

San Francisco, 1400 tons, Hetch Hetchy Trans-Bay double pipe line; bids March 6.

Fiske Brothers Refining Co., 24 State Street, New York, has acquired exclusive manufacturing and sales rights of Lubriplate lubricants, which it has manufactured for the Lubriplate Corpn. during past two years. New division of Fiske company will be under direction of Robert L. Watts.

Reinforcing Steel

Awards 615 Tons—New Projects 1855 Tons

AWARDS

Holyoke, Mass., 100 tons, highway bridge, to Northern Steel Co.

Des Moines, Iowa., 130 tons, post office, to Concrete Engineering Co.; previously reported to an unnamed bidder.

Santa Ana, Cal., 322 tons, block "A" at Santa Ana high school, to Soule Steel Co.

Yellowstone National Park, Wyo., 190 tons, utility building, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Chicago, 100 tons, for Wander company.

Chicago, 700 tons, Sanitary District; S. A. Healy Co., general contractor.

State of Illinois, 200 tons, road and bridge work.

St. Louis, 450 tons, addition to Homer Phillips negro hospital; H. B. Deal Co., St. Louis, low bidder.

Salt Lake City, Utah, 435 tons, Moon Lake dam; general contract awarded, and Bureau of Reclamation will take bids for steel shortly.

State of Colorado, 117 tons, highway work in three counties; bids Feb. 18.

San Francisco, 1200 tons, Marina junior high school; bids Feb. 20.

Glendale, Cal., 100 tons, material for city; bids Feb. 14.

Long Beach, Cal., 100 tons, Hamilton junior high school; general contract awarded.

Eugene, Ore., 100 tons, University library, $350,000 allotted by PWA; bids soon.

OBITUARY

JOSEPH R. THOMAS, formerly treasurer of American Steel & Wire Co., Cleveland, died at the Cleveland Clinic, Feb. 9, aged 73 years. He was connected with the Salem Bale & Wire Co., Salem, Ohio, before it was merged with the American Steel & Wire Co. He retired seven years ago and since then had lived in Aurora, Ohio.

❖ ❖ ❖

J. LEE RODGERS, vice-president and treasurer of National Valve & Mfg. Co., Pittsburgh, died on Feb. 11. He was born in Jamestown, Pa., 57 years ago. He was founder of the National Valve company.

❖ ❖ ❖

WILLIAM D. CRAWFORD, formerly president of the La Belle Iron Works, Steubenville, Ohio, now part of the Wheeling Steel Corpn., died at Miami, Fla., on Feb. 11. He was 78 years old and had been retired since 1918.

❖ ❖ ❖

U. U. CARR, general superintendent, Diamond Machine Co., Pittsburgh, died on Feb. 11, at his home in Monongahela, Pa., aged 59 years. He was a member of the American Society of Mechanical Engineers and the Engineers Society of Western Pennsylvania.

❖ ❖ ❖

G. A. SPANG, president of Spang & Co., Butler, Pa., died on Jan. 22. He started in the tool business in Butler in 1895.

❖ ❖ ❖

WILLIAM CLIFTON GODFREY, a developer and director of the Chapman Valve Co., and interested in various other Springfield, Mass., industries, died in that city on Jan. 31. He was born in Milltown, Ireland, May 26, 1856.

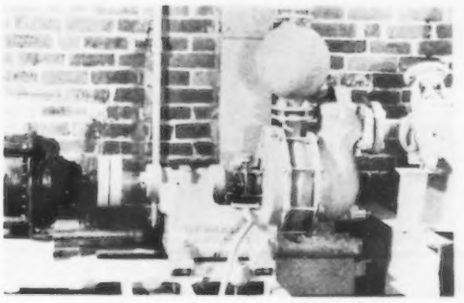
❖ ❖ ❖

ARTHUR F. WOODFORD, secretary since 1908 of the Sessions Foundry Co., died as a result of a shock at his home in Bristol, Conn., on Jan. 30.

DURIRON *is used by*

MERRIMAC CHEMICAL COMPANY
SUBSIDIARY OF
Monsanto Chemical Company
BOSTON, MASS.

for unloading tank cars of Sulphuric Acid



Shown here is a Duriron self-priming pump, Type D2GS—9½, used for unloading tank cars of sulphuric acid, transfering the acid to storage tanks and from storage tanks to mixing tanks. The by-pass arrangement with the Duriron valve makes it possible to use this one pump for both purposes—an economical layout.

Naturally enough, these folks know acids and how to handle them. They know, too, that Duriron Equipment is satisfactory or they wouldn't use it.

For your own tank car unloading, a Duriron pump will save man-hours, time, money—something of interest to you. And it's safer than air.

We'll be glad to give you more information about this and the names of other companies who are using Duriron pumps. Just write

THE DURIRON COMPANY, Inc.

438 N. Findlay Street **Dayton, Ohio**

Railroad Equipment

Pennsylvania Salt Mfg. Co. has ordered four tank cars from General American Transportation Corpn.

New York Rapid Transit Co. will open bids on March 1 for 25 five-section articulated car units for service on subway and elevated lines.

Missouri & North Arkansas has sold 200 freight cars and 15 locomotives to Iron & Steel Products, Inc., Chicago, for dismantling.

Burlington may build 500 composite coal cars in its own shops.

Cincinnati, New Orleans & Texas Pacific has ordered 300 automobile freight cars from Pressed Steel Car Co. Cars will be built at company's McKees Rocks, Pa., plant.

RAILS

Milwaukee Road may enter the market for 10,000 tons of rails.

Central of Georgia has ordered 3800 tons of rails from Tennessee Coal, Iron & Railroad Co.

St. Louis-San Francisco has ordered 15,000 tons of rails from Tennessee Coal, Iron & Railroad Co.

"HERCULES"
RED-STRAND
REG. U.S. PAT. OFF.
WIRE ROPE

Furnished in Flattened Strand, Round Strand, Preformed, Steel Clad and Non-Rotating constructions.

A GIANT in Strength and Endurance

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ST. LOUIS, MO.

NEW YORK
CHICAGO
DENVER
SAN FRANCISCO

Metallurgical Advisory Board Reports Year's Developments

(CONTINUED FROM PAGE 38)

As rolled—None.

Quenched and tempered — All the steels tested.

Normalized from 875 deg. C.—SMA-15, 17, 22, K-7 (possibly).

Normalized at 1000 deg. C—SMA-17.

Normalized at 1050 and 1100 deg. C. —SMA-17 (possibly).

(8) The normalized SMA steels have good ductility at 0 deg. C. after cold work, but steel K-7 is quite brittle. In the "as-rolled" condition all steels tested were brittle at 0 deg. C. after being cold worked, except a ¾ in. angle of SMA-15.

(9) In the medium carbon steels, 0.45 per cent carbon, the difference between the aluminum-killed and the silicon-killed steels in their behavior in impact at low temperatures was not pronounced, the SMA steel being only slightly more resistant to embrittlement than the silicon-killed steel. From the shape of the impact-temperature curves it is evident that for low temperature service in this material it would be necessary to introduce alloying elements rather than to manipulate the deoxidation practice.

(10) After cold work the SMA steels in the normalized conditions have good ductility at 0 deg. C., but steel K-7 is quite brittle. In the "as-rolled" condition all the steels tested were brittle at 0 deg. C., after being cold worked, except a ¾ in. angle of SMA-15.

Following Dr. Herty's presentation of this paper, a formal discussion was given by A. B. Kinzel, chief metallurgist of the Union Carbide and Carbon Research Laboratories. Dr. Herty then reviewed extensive data on the general subject of deoxidation of steel.

TABLE I—Analysis of Steels Used to Determine Low Temperature Impact Values

Heat No.	C	Mn	P	S	Si	Metallic Al	Ni	N_2	Total O. by Vacuum Fusion
SMA-15 ..	0.15	0.71	0.010	0.029	0.074	0.025	...	0.005	0.0012
SMA-17 ..	0.17	0.56	0.026	0.028	0.150	0.038	0.26	0.003	0.0023
SMA-22 ..	0.22	0.58	0.020	0.043	0.088	0.033	...	0.004	0.0015
K-7	0.15	0.56	0.024	0.040	0.074	0.010	...	0.005	.....
AX	0.21	0.43	0.016	0.043	0.111	....	...	0.005	.....
R	0.14	0.51	0.021	0.035	....	....	...	0.007	.....
SMA-48 ..	0.48	0.74	0.022	0.030	0.205	0.020	...	....	.....
AL	0.40	0.65	0.031	0.029	0.175	....	...	....	.....

The deoxidation of open-hearth steel was discussed from the standpoint of steel cleanliness and deoxidizer efficiency, and allied subjects, such as rephosphorization after deoxidation, were brought to the attention of the assembled metallurgists. Finally a brief review of the various methods of determining inclusions was given.

The general principle of inclusion elimination is that the particles formed on deoxidation shall be large enough, through fluxing and coalescence, that they rise out of the steel before the metal solidifies. The tendency for fluxing and coalescence is related to the fusibility of the deoxidation products, which can be predicted from the melting point diagrams of the oxides involved. The largest inclusions and those having the lowest melting points are found in the manganese silicate or manganese-aluminum silicate slags, resulting from the deoxidation of steel with manganese-silicon or manganese-silicon-aluminum alloys. All factors considered, manganese-silicon alloys with a ratio of manganese to silicon of 4 or 5 to 1 give the best types of inclusions for rapid elimination.

The amount of deoxidizer added in the furnace is of great importance in determining steel cleanliness, as ladle deoxidizers produce inclusions, and the lower the iron oxide content of the metal entering the ladle the fewer the inclusions formed. It was finally shown by Dr. Herty that steel cleanliness increases with increasing additions of manganese-silicon alloys up to an addition equivalent to 0.13 per cent silicon.

For certain types of materials it is necessary that some of the deoxidation products remain in the steel as a fine dispersion. Methods of obtaining such dispersions and their effect on the finished product were given in previous bulletins of this series.

The losses of deoxidizers are affected by the oxidation of the metal and slag, the physical condition of the slag, the temperature and the addition of more than one deoxidizer. The stronger the furnace deoxidation with silicon, the higher the efficiency of manganese in the furnace, and other oxidizable alloys added either in the furnace or ladle.

Iron Oxide Can Be Closely Controlled

The final paper of the meeting was on the general subject of physical chemistry of steel making. Specifically the information presented was on the control of iron oxide in the basic open-hearth proc-

ess, and a wealth of data as well as recommended practices were placed before the assembled metallurgists.

The bulletin on steel making contained the results of experimental work on the control of iron oxide in the slag and metal for high and low carbon steels. The basic open-hearth process was reviewed and a detailed discussion was given of the theoretical relationship between slag and metal as regards to iron oxide. An empirical relationship has been determined for the effect of slag basicity on the available iron oxide in the slag, and the effect of this available iron oxide on the oxidation of the metal has been shown to be a straight line function, even though the carbon content of the metal is neglected.

It was found convenient in discussing the action of oxygen in the slag to divide the heat into various parts and to determine the action of oxygen in each. These various parts include the melting of the scrap, the early portion of the lime boil when the slag is quite acid and the iron oxide in the slag reaches a minimum, the period from the middle of the lime boil to the ore addition, the ore addition, and the refining period between the ore addition and deoxidation. The two most important periods of the heat are the period just before the ore addition and the refining period. In the former the fluidity of the slag is of the utmost importance in controlling iron oxide, whereas in the latter the basicity of the slag is controlling. Experimental evidence was given by Dr. Herty to show that the basicity effect is one of changes in slag fluidity with temperature as well as the formation of lime-iron oxide compounds. During the experimental work a new viscosimeter was developed by which slag fluidities were estimated on all experimental heats.

On low-carbon heats, iron oxide in the slag and metal builds up very rapidly after about 0.10 per cent carbon has been reached, and the effect of slag composition is not so pronounced below this carbon content. During the early stages of the heat, however, fluidity and basicity are very important on this grade of steel. In order to arrive at the proper conditions of fluidity and basicity the amount of lime in the charge must be varied with respect to the total silicon in the charge. The ratio of lime to total silicon is of extreme importance in iron oxide control.

Two general methods of control were discussed by Dr. Herty, namely, the analysis of the slag for iron oxide or silica followed by proper additions of lime, sand, or roll scale as conditions warranted, and a method involving the use of slag, fluidity and the phosphorus content of the metal. These latter two items enable a close prediction of the iron oxide content of the finishing slag. Proper adjustments of slag composition can be made after the preliminary tests for phosphorus or the tests for slag fluidity.

Iron oxide control was discussed under the following headings: iron oxide content of the metal, phosphorous control, sulphur elimination, residual manganese, costs of deoxidation, iron loss and furnace yield, steel cleanliness, and the action of steel in the mold on rimmed and semi-killed steels. The appendix was devoted to the pertinent methods of analysis and methods of calculating slag weights and oxygen balances.

A more inclusive summary of this experimentation could be stated in the following manner:

(1) Iron oxide in basic open-hearth slags may be controlled between close limits on high and low carbon steels.

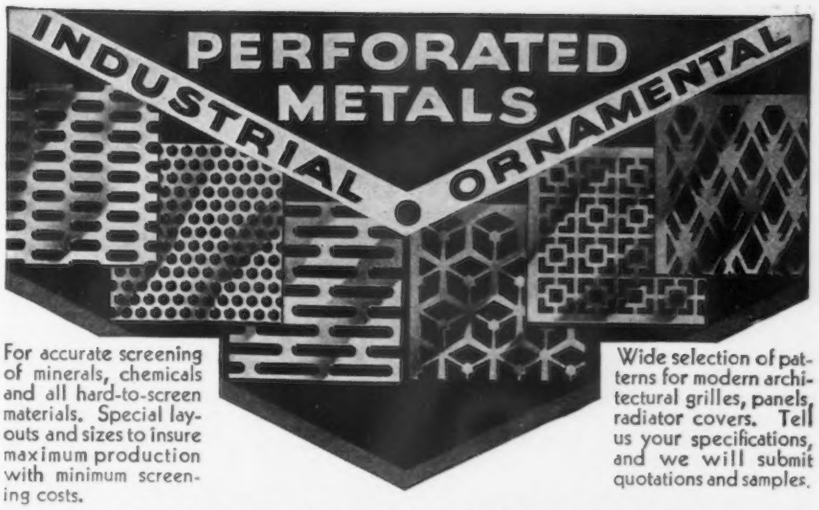
(2) The two most important factors in iron oxide control are the fluidity and basicity of the slag. These are profoundly influenced by the composition of the charge, particularly in silicon, and the amount of lime charged and worked during the heat.

(3) Four items which can be readily determined are useful in various combinations for defining the steps to be taken in adjusting the iron oxide content of the slag, namely, the fluidity of the slag, the phosphorus content of the metal, the iron oxide content of the slag, and the silica content of the slag.

(4) As the basicity of the slag increases, the available iron oxide in the slag decreases for a given total iron oxide.

(5) The FeO content of the metal is directly proportional to the available iron oxide content of the slag.

(6) Iron oxide control directly affects a number of important items in the manufacture of steel.



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ANY METAL ANY PERFORATION

The Harrington & King Perforating Co.

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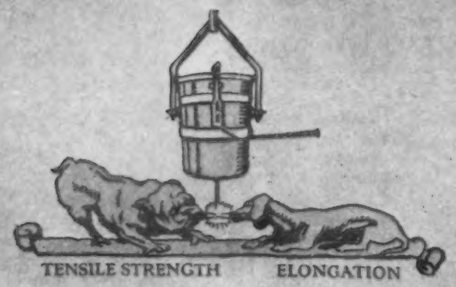
New Handbook on Cemented Carbides

PROFITABLE use of Carboloy cemented carbides is discussed in an attractive 36-page booklet, issued as a catalog supplement S-C-35, by Carboloy Co., Inc., 2985 East Jefferson Avenue, Detroit. A number of tool set-ups is shown noting ft. per min. increases in cutting speeds over previous toolings. Boring and facing operations on the harder materials are compared from previous cost viewpoint. Advantages of cemented-carbide-tool use in the machining of castings are presented as effective in cast metal saving. Equipment, together with the necessary fundamental knowledge and experience, required for the successful use of Carboloy is outlined and practical examples are given. Physical characteristics of the product are specified, along with picturization of its processing. The company organization, and its plant and service, are described.

STRONG STEEL CASTINGS



Strong Steel Foundry Co.

Buffalo, New York

The Case for and Against The Shorter Work Week

(CONCLUDED FROM PAGE 19)

consciously influencing the believers in these respective theories, should not be overlooked.

For example, it is easy for a labor union, dedicated to the raising of wages, to become convinced that the welfare of the country depends upon the raising of wages.

Again, for example, it is easy for political leaders, who like to spend public money anyway, to become convinced that the welfare of the country depends upon enlarging their activities and spending more money.

And again, for example, it is easy for employers of labor, who are in business to make profits, to become convinced that the welfare of the country depends upon easing the way toward the making of profits.

On a basis of cold logic, the welfare of the country as a whole (and therewith the long-range welfare of each group) appears to lie sometimes in one direction and sometimes in another. If the raising of wages and the free-handed increase of government overhead could be confined to boom periods, and if the emphasis on profits could be confined to depression periods, it is conceivable that booms and depressions might be substantially reduced in severity in this way. (Incidentally, since 1929, our Government has followed an exactly opposite policy to this, resisting the reduction of labor costs in proportion to prices; and increasing overhead costs in many ways.)

On the other hand, it is a question whether, on a complicated subject of this kind, human nature is such that self-interest can be made sufficiently understanding and farsighted to continually subordinate itself to the public welfare. Any program involving continually manipulating wages and profits and government expenditures, at just the right times and to just the right extent, appears almost certainly foredoomed to failure.

Perhaps an entirely different approach to this general problem, involving no artificial manipulation of wages or profits or public spending, would be more likely to succeed. There is such another approach. This has already been touched upon above. It consists in so controlling the financial machinery of the country as to prevent rapid rises and falls in the general price level. A stable general price level (in other words a dollar of stable general purchasing power) would do much to prevent wage and overhead costs from getting out of line with prices, either on the side of causing a boom or on the side of causing a depression. The question of whether such a control is possible, in view of the failure of past experiments in this direction, may be worthy of more careful consideration than it has yet received.

Flying Yankee New Stainless Steel Train

(CONCLUDED FROM PAGE 43)

ner to the cylinder block. About mid-length are cast 24 oblique air-intake ports circling each cylinder liner. Thus, the cylinder block forms an air-intake manifold in which pressure is maintained by a three-lobe, twin-rotor scavenging blower, or compressor, mounted on the front end of the engine block. This arrangement of air intake and the use of four exhaust valves per cylinder insures scavenging of the cylinder at a minimum blower pressure. The heads of the aluminum alloy pistons are cooled by a stream of oil.

Exhaust Manifold Inside Engine Room

To preserve a smooth roof line the exhaust manifold has been lowered into a drop section in the car roof and the customary roof radiators regrouped to form two long sections suspended from the roof inside the engine room. With this inside mounting an artificial breeze is supplied by two large engine-driven fans mounted above the partition separating the engine room from the control cab. A grilled opening in the front of the train admits air to the fans via a duct formed by the cab ceiling and the car roof. The air passes through the cooling radiators and thence outside through a central longitudinal slot in the roof.

The main generator, a single-bearing differentially wound machine, is placed forward of the engine and directly connected through a flexible steel disk coupling. Output of the 35 kw. four-pole direct current commutating pole type auxiliary generator is furnished to the air compressors, the air-conditioning equipment, motor for train heating boiler, battery charging, lights, control, buffet utensils, etc. The storage battery, an Exide Ironclad 32-coil, 64-volt unit rated at 450 amp.-hr. at the 10 hr. discharge rate, is arranged in tiers along the walls of the engine compartment. It is used for engine cranking, in addition to supplying power to the auxiliary circuits.

Machine Tool Show To Be Largest Yet

[CONCLUDED FROM PAGE 35]

that all available exposition space will have been exhausted months in advance of the actual opening of the exposition.

Applications for space in the show have already been received from 110 member companies of the National Machine Tool Builders' Association and some 75 companies in the accessory field. A considerable number of applications for space from the latter are still expected.

Drawing of space for member companies by lot was held at the offices of the association recently, and it is expected that the drawing for companies in the accessory field will take place shortly.

A complete list of companies leasing exhibit space in the exposition will be announced by the association in the near future.

Roller Bearings for Heavy Radial Load

TAPERED roller bearings, illustrated on page 33, were made by the Bantam Ball Bearing Co., South Bend, Ind., for use in the headstocks of the new Wickes Brothers, Saginaw, Mich., broaching lathes described in THE IRON AGE of Dec. 13, 1934.

The bearings are 24¼ in. O.D. by 19 in. I.D. by 2.000 in. long over the cones, and 1.750 in. long over the cups and have radial load-carrying capacity of 119,000 lb. at 100 r.p.m.

Industrial Locomotive Exports Shipment

In announcing a recent shipment of industrial locomotives to Spanish Guinea, West Africa, the Davenport Locomotive Works, Division of the Davenport Besler Corpn., Davenport, Iowa, calls attention to a new series of industrial gasoline and Diesel geared locomotives.

SPONGE IRON
and
POWDER IRON
for
Metallurgical and Chemical Use

Steels made with SWEDISH SPONGE IRON as a raw material show a VIBRATION DAMPENING CAPACITY TWICE that of similar steels made with scrap as a raw material. Reference: Report of Investigations, Bureau of Mines, R. I. 3229, page 63.—Obtainable from us or directly from B. M.

Sponge Iron will be discussed on Tuesday, February 19th, morning session, Annual Meeting of American Institute of Mining & Metallurgical Engineers

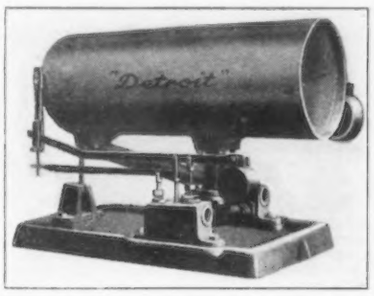
EKSTRAND & THOLAND, INC.
122 E. 42nd ST., NEW YORK CITY
DETROIT—CHICAGO

ranging in capacity from 2½ to 25 tons.

Hand-operated, lever type brakes are standard on all of the smaller sizes up to 12 tons; on the 7 to 12-ton sizes air brakes are optional; 15 to 25-ton sizes have air brakes and also auxiliary, hand-operated brakes of lever type. Maximum hauling power is attainable at speeds as low as 2½ to 3 m.p.h.

New Detroit Steam Trap

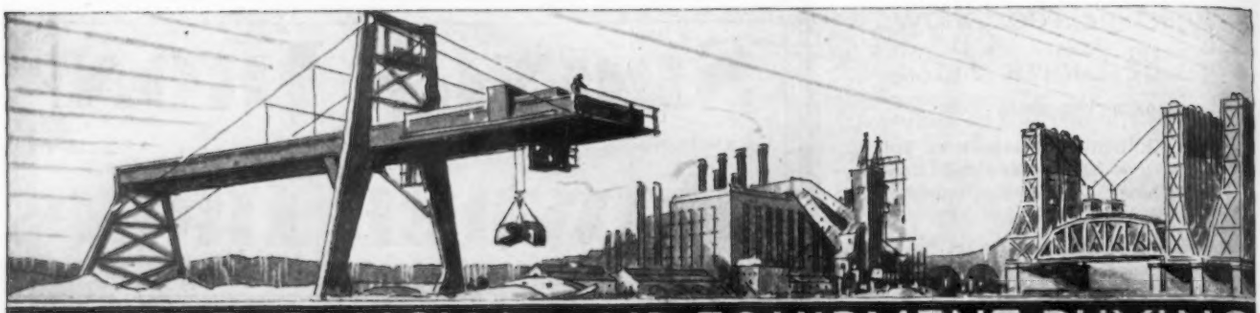
The principle of the new Detroit steam trap, manufactured by the Nason Mfg. Co., 71 Fulton Street,



New York, is automatic operation of valves, actuated by a tilting tank through an arrangement of levers. The tank, mounted eccentrically on hollow trunion, is held in horizontal position when empty by means of large counterweight. When the tank fills with water, through the hollow trunion, counterweight is overbalanced and the tank tilts, actuating the valves. The traps use the same volume of steam as of water fed to boiler; do not require lubrication and have only two valves. They handle water and return it to the boiler at temperature as high as 335 deg. Fahr. When used instead of pump they increase thermal efficiency by returning condensate hot. A counter records number of operations; accurate meter is obtained, allowing accurate check on feed water and of heat surface, boiler hp. and heater capacity.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, has received an order from the Tennessee Valley Authority for two water-wheel generators and auxiliary equipment, amounting to approximately $900,000. The generators will be installed at the Norris Dam power plant on the Clinch River, northwest of Knoxville, Tenn. This equipment will be fabricated at the Westinghouse company's East Pittsburgh works, and will require approximately 500 man-hours of work.

The De Laval Separator Co., New York, has been awarded two additional contracts, for complete lubrication systems, by the United Engineering & Foundry Co., Pittsburgh. They will be installed in connection with the new 20½ in. x 56 in. x 84 in. cold reversing mill, two skin pass mills and a 19 in. x 49 in. x 56 in. 4-high, three-stand, tandem cold strip mill, now being built for the Ford Motor Co. by the United company.



PLANT EXPANSION AND EQUIPMENT BUYING

Automotive Tool Buying Expected To Start Earlier Than Usual

THE moving forward of automobile new model announcements this year is expected to have a marked effect on machine tool demand. Equipment purchases may begin during the summer and will naturally be carried on until the new models are actually introduced around Nov. 1. Car manufacturers today are examining production costs carefully and considerable machinery buying is expected to develop in the next 60 days. Chevrolet has recently purchased some tools.

Pending orders from the U. S. S. R. which would have meant considerable business to the United States machine tool industry are believed to have been lost to foreign competitors because of the impasse between the governments of the two countries. Machine tool demand from other foreign countries is fairly well maintained.

NORTH ATLANTIC

Hendrick Brewing Co., Inc., 410 Central Avenue, Albany, N. Y., has asked bids on general contract for new one and two-story plant. Cost over $50,000 with equipment. T. L. Gleason, 98 Chestnut Street, is architect.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Feb. 18 for 65,000 ft. cable and 65 reels (Circular 80); until Feb. 25, 30,000 ft. cable and 12 reels (Circular 83).

Continental Can Co., 1 Pershing Square, New York, has superstructure under way on addition to plant at Oakland, Cal., for which general contract recently was let to Austin Co., Oakland, and Cleveland. Cost over $200,000 with equipment. San Francisco offices of company are at 155 Montgomery Street.

Consolidated Electric Meter Co., Inc., New York, has been organized by Samuel Morse, 1676 Grand Avenue, Bronx, and associates, to manufacture meters and other precision instruments.

Board of Education, Putnam Valley, N. Y., plans manual training department in new multi-story school, for which bids are being asked on general contract. Cost about $375,000. A. F. Gilbert, 358 Fifth Avenue, New York, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 19 for 20 portable gage-testing outfits (Schedule 4259), 800 storage battery testing outfits (Schedule 4249), 1800 industrial thermometers, 620 general laboratory use thermometers, 250 water thermometers and 1080 separable sockets (Schedule 4288), 600 oil-burning deck lanterns, 37 oil-burning running lights, 18 oil-burning signal lights (Schedule 4258); until Feb. 26, four sets triplex milling heads (Schedule 4292), roller track steel forgings (Schedule 4286), 424 rough machined turret roller forgings and 424 turret rollers (Schedule 4250) for Brooklyn Navy Yard; 64 chronometric tachometers (Schedule 4267) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards.

Schenley Products Co., 20 West Fortieth Street, New York, liquor products, has leased building at Eleventh Avenue and Twenty-seventh Street, for new factory branch, storage and distributing plant.

General Aniline Works, Inc., 1150 Broadway, New York, has asked bids on general contract for five-story addition to plant at Rensselaer, N. Y., 30 x 82 ft. Cost over $85,000 with equipment.

United States Engineer Office, First District, New York, asks bids until Feb. 18 for cast iron grate bars, two eccentric sheaves for drag hoist engine, and two valve disks and disk nut for dredge pump throttle valves (Circular 198).

Utility Blade Co., 200 Burnett Avenue, Maplewood, N. J., manufacturer of knives, scissors and other cutlery, has leased building at 17-21 Newark Way, for new branch plant, primarily for production of scissors.

Oliver Wire Works, Inc., Newark, N. J., has been organized by Norman Oliver and associates, capital $125,000, to manufacture wire goods and allied metal products. New company will take over concern of same name with plant at 146 Fuld Avenue.

Gottfried Kruger Brewing Co., 75 Belmont Avenue, Newark, N. J., is arranging early call for bids on general contract for plant extensions and improvements, including new equipment. Cost over $150,000 with machinery. Waldemar Mortensen, 103 Park Avenue, New York, is architect and engineer.

New York Revolving Portable Elevator Co., 333 Garfield Avenue, Jersey City, N. J., manufacturer of industrial elevators, parts, etc., has acquired property, 60 x 165 ft., at North Bergen, N. J., and plans early erection of one-story plant. Cost over $40,000 with equipment.

Reading School District, Ninth and Washington Streets, Reading, Pa., plans manual training department in new three-story and basement junior high school on Chestnut Street. Cost about $360,000. Associated Architects, Inc., 226 North Sixth Street, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 19 for one special flat lapping machine (Schedule 4280), one motor-driven bench lathe (Schedule 4284), one motor-driven automatic plain milling machine (Schedule 4281), 250 aircraft turn and bank indicators (Schedule 4254), 10 engine-driven vacuum pumps (Schedule 4273); until Feb. 26, nine pedestal type grinding machines (Schedule 4298), one motor-driven surface grinder, hydraulic drive table (Schedule 4296), 750 dynamotors (Schedule 4256) for Philadelphia Navy Yard.

NEW ENGLAND

Public Works Officer, Naval Hospital, Newport, R. I., asks bids until Feb. 21 for new cold storage and refrigerating plant, including motor-driven compressors and condenser units, automatic temperature control equipment, cooling coils, etc. (Specification 7865).

Interlaken Mills, Turks Head Building, Providence, R. I., plan addition to power plant at cotton mills at West Warwick, R. I., including new equipment. Cost close to $35,000 with equipment. John A. Stevens, Inc., 16 Shattuck Street, Lowell, Mass., is consulting engineer.

Romex Laboratories, Inc., New Bedford, Mass., has been organized by Frank R. Viera and Saul Abrams, Briggs Court, to manufacture electrical appliances and equipment.

Board of Education, Worcester, Mass., W. S. Young, City Hall, superintendent of schools, plans manual training department in new multi-story junior high school on Lincoln Street. Cost over $250,000. G. A. Johnson, 16 Norwich Street, is architect.

Reynolds & Co., Inc., Danbury, Conn., has been organized by Alfred E. Reynolds, 161 Main Street, and Asher Papish, 21 Downs Street, to manufacture art metal products.

OHIO AND INDIANA

City Council, Dover, Ohio, plans extensions and improvements in municipal electric light and power plant, including new generating equipment and other machinery. Fund of $330,000 is being arranged. William C. Kammerer & Associates, Sloan Building, Cleveland, are consulting engineers; Waldo Hartline is city engineer.

Village Council, North Baltimore, Ohio, will take bids early in spring for pumping machinery and accessories, pipe lines, etc., for municipal waterworks. Fund of $109,000 has been arranged. A. H. Smith & Niles Co., 112 East Woodruff Avenue, Toledo, Ohio, is consulting engineer.

Pneumatic Rail Corpn., Canton, Ohio, has been organized by Melville Howald and Frank B. Melchoir, care of Wendell Herbruck, Renkert Building, representative, to manufacture rail conveyor equipment and kindred mechanical specialties.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Feb. 18 for 465 ignition manifold assemblies (Circular 463); until Feb. 20, 20 floodlight bridge assemblies, one tower assembly, and three steel and exhibit house assemblies

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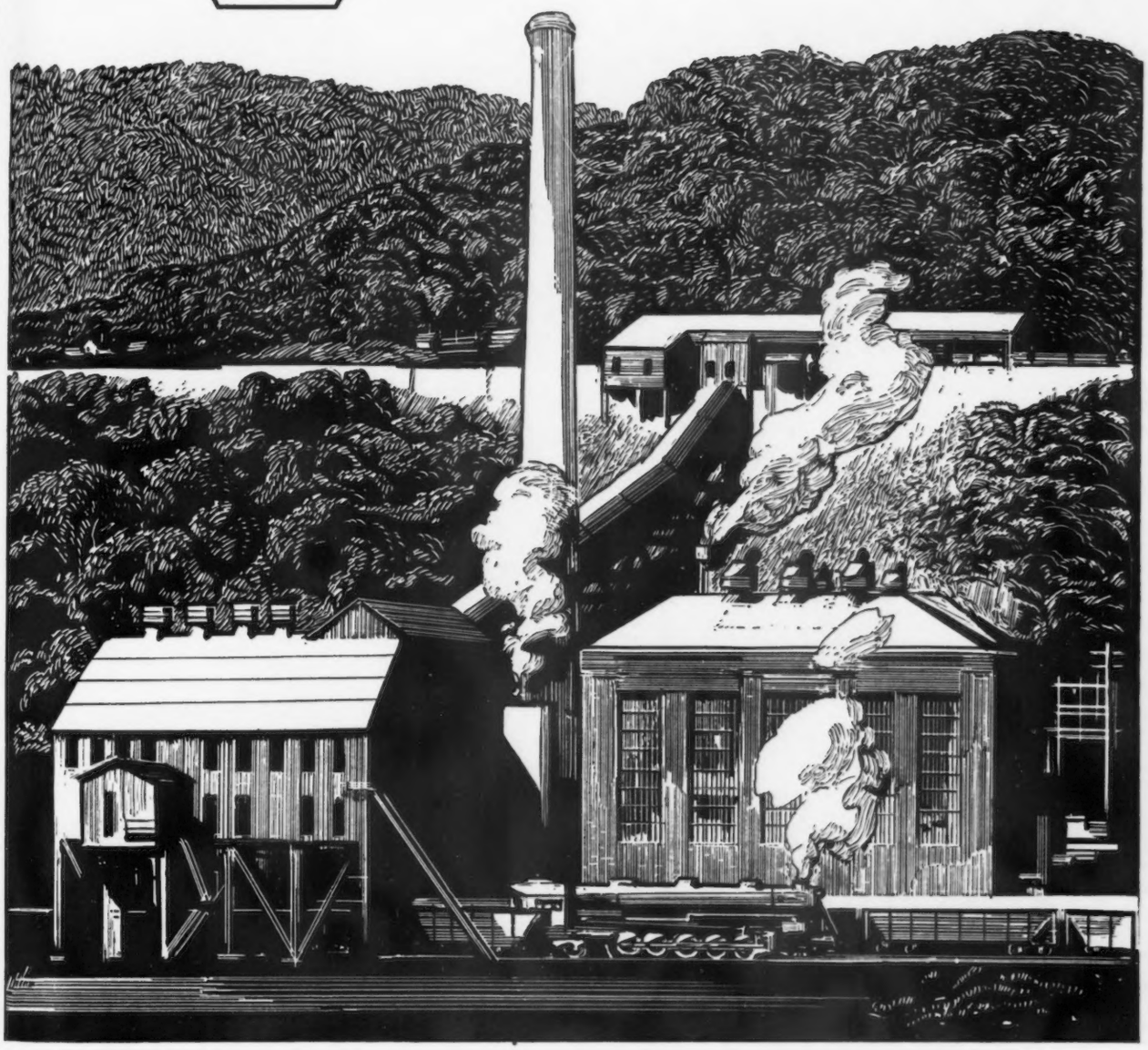

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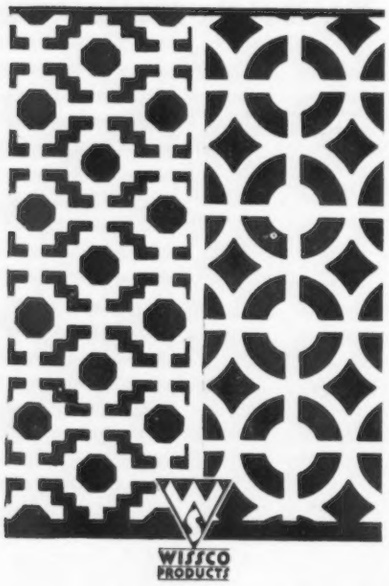
Atlanta Chicago Cincinnati Cleveland Detroit New York Norfolk Philadelphia Winston-Salem



NEW DESIGNS

Increased free air openings and greater concealment are important features of the new Wissco designs in decorative perforated metals. A new folder showing them, as well as all other of the popular Wickwire designs, is now ready. Send for a copy.

WICKWIRE SPENCER STEEL CO.

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PERFORATED METALS

(Circular 475), steel wool (Circular 479); until Feb. 21, aluminum tubing, aluminum rods, aluminum sheets, aluminum alloy bar, aluminum alloy rods, aluminum alloy sheets and aluminum alloy tubing (Circular 440); until Feb. 25, 60 floodlight lamp assemblies, three beacon lamp assemblies (Circular 472), 181 receptor assemblies (Circular 480), 611 gun mounting post assemblies and 611 bolt and bracket assemblies, gun trunnion (Circular 481); until Feb. 26, running lamp lenses (Circular 482); until March 1, electric starter assemblies and starter extension assemblies (Circular 474).

Air Reduction Co., 940 Kenyon Avenue, Cincinnati, has let general contract to Lehigh Construction Co., 418 York Street, Newport, Ky., for one-story factory addition, 20 x 80 ft.

Schwitzer-Cummins Co., 1125 Massachusetts Avenue, Indianapolis, manufacturer of automobile and tractor fans, and kindred mechanical equipment, has let general contract to E. B. Ball & Son, 1131 North Tacoma Avenue, for one-story addition, 22 x 75 ft.

Old Quaker Distilling Co., Lawrenceburg, Ind., has let general contract to Frank Messer & Sons, Inc., 2515 Burnet Avenue, Cincinnati, for 10-story addition for storage and distribution. Cost over $250,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is engineer.

SOUTHWEST

United States Engineer Office, Missouri River Division, Postal Telegraph Building, Kansas City, Mo., asks bids until Feb. 20 for spare parts for dredge pumps, including casings, runners, back heads, front heads, stuffing boxes, etc. (Circular 207).

Purchasing and Contracting Officer, Quartermaster Corps, Fort Sill, Okla., asks bids until Feb. 27 for furnishing and installing a steel-cased well and pumping station at Fort Gibson, Okla. (Circular 39).

City Council, Washington, Kan., has voted bonds for $88,000 for new municipal electric light and power plant, using Diesel engine-generating units. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

City Council, Little Rock, Ark., has authorized new joint administration building and hangar, with repair and reconditioning shops at municipal airport. Cost over $50,000 with equipment. Financing is being arranged. City engineer is in charge.

Texas Wire & Nail Co., Galveston, Tex., has been organized with capital of $300,000 to manufacture wire goods, nails and kindred specialties, and will take over and expand local plant of Texas Wire & Nail Mfg. Co.

Trustees of St. Louis-San Francisco Railway have been authorized to buy following equipment: Tutlow air motor to drive turntable, for use at Hugo, Okla.; air motor on turntable for Enid, Okla.; No. 3-300 amp. portable electric welding machine; No. 1 10-ft. power gap shears, one 300 amp. portable electric welding machine for Springfield, Mo., 3-ton pneumatic hoist for Lindenwood, Mo., and one 4½ x 8 ft. portable cylinder boring bar for Kansas City, Mo.

BUFFALO DISTRICT

Board of Village Trustees, Genesco, N. Y., plans new municipal electric light and power plant. Cost about $125,000 with equipment. L. C. Reynolds, 387 Castle Street, Geneva, N. Y., is consulting engineer.

United States Engineer Office, Buffalo, will receive bids until Feb. 18 for two 15-in. centrifugal pumps and accessories (Circular 71).

Herb Smith Equipment Corpn., Rochester, N. Y., has been organized by Herbert M. and S. M. Smith, 699 Main Street East, and associates, to manufacture machinery and parts.

Howard Smith Paper Mills, Ltd., 407 McGill Street, Montreal, has plans for extensions and improvements in sulphite pulp division of paper mills at Cornwall, Ont. Cost over $75,000 with equipment. B. D. Millidge is manager at mill.

WESTERN PA. DIST.

Hookless Fastener Co., Meadville, Pa., manufacture of metal specialties, has plans for three and four-story addition, 60 x 300 ft., for which bids will be taken on general contract at once. Cost about $350,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers.

United States Engineer Office, Huntington, W. Va., asks bids until Feb. 28 for oil pumps and accessories for hydraulic operations, air compressor and air receiver, fuel oil storage tanks, oil piping, standby power unit with cooling water tank, switchboard and other equipment for lock and dam on Kanawha River, near Winfield, W. Va.

Schenley Distillers Corpn., 20 West Fortieth Street, New York, has let general contract to Rust Engineering Co., Koppers Building, Pittsburgh, for multi-story addition to distillery of Joseph Finch Co., Schenley, Pa., a subsidiary, for storage and distribution. Cost close to $150,000 with conveying, loading and other equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer.

Castanea Paper Co., Johnsonburg, Pa., plans one-story addition to sulphite pulp plant. Cost over $35,000 with equipment.

SOUTH ATLANTIC

Gulf Oil Co., Jacksonville, Fla., has acquired property on Lakeshore Boulevard, Sanford, Fla., for new bulk oil storage and distributing plant. Cost over $40,000 with tanks and equipment. Company executive offices are at Pittsburgh.

Premier Brewing Co., High Point, N. C., recently organized by J. Berg von Linde, High Point, and associates, has engaged Waldemar Mortensen, 103 Park Avenue, New York, architect and engineer, to draw plans for new plant on 15-acre tract on High Point-Greensboro highway. It will comprise several one and multi-story units, with boiler house and machine shop. Cost over $150,000 with equipment.

Board of City Commissioners, Jacksonville, Fla., is considering extensions and improvements in municipal airport, including new hangars with shop and service facilities. Fund of about $300,000 will be arranged for project.

City Council, Statesville, N. C., asks bids until Feb. 18 for pumping machinery and accessories, chlorinator and dry feed machine, and other machinery for municipal waterworks. Spoon & Lewis, Greensboro, N. C., are consulting engineers.

MICHIGAN DISTRICT

Detroit Steel Corpn., 1025 South Oakwood Avenue, Detroit, has approved plans for expansion and improvements, including new equipment in annealing furnace department and other divisions. Cost about $125,000 with machinery.

City Council, office of city clerk, Battle Creek, Mich., asks bids until Feb. 26 for tanks, screens, pumping machinery and accessories, sludge drying equipment, etc., for new municipal sewage treatment works. Cost about $275,000.

Standard Gray Iron Foundry, Inc., 850 Grove Avenue, Wyandotte, Mich., has been organized by Michael Puhek, 668 Glover Avenue, Detroit, and associates, to manufacture iron and other metal castings.

Reynolds Spring Co., Jackson, Mich., manufacturer of automobile springs and kindred equipment, has leased former plant of Lockwood Motor Co., totaling about 20,000 sq. ft. floor space, for new branch assembling works.

Hancock Park Brewery Co., Hancock, Mich., has been acquired by new interests, headed by Julio Manasche, Hancock. Plans are under way for remodeling and improving, including main brew-house and new equipment. Cost over $50,000 with equipment.

MIDDLE WEST

Enameled Steel Sign Co., 423 West Ontario Street, Chicago, has leased about 90,000 sq. ft. in building at Arthington and Taylor Streets, for new plant.

Rockford Screw Products Co., 2501 Ninth Street, Rockford, Ill., manufacturer of set screws, bolts, caps, etc., has let general contract to Linden & Sons, Inc., 1102 Tenth Street, for one-story addition, 60 x 96 ft., to be used in part for expansion in heat-treating department. Peterson & Johnson, Swedish-American Bank Building, are architects.

Mechanics Universal Joint Co., 310 South Michigan Avenue, Chicago, has been or-

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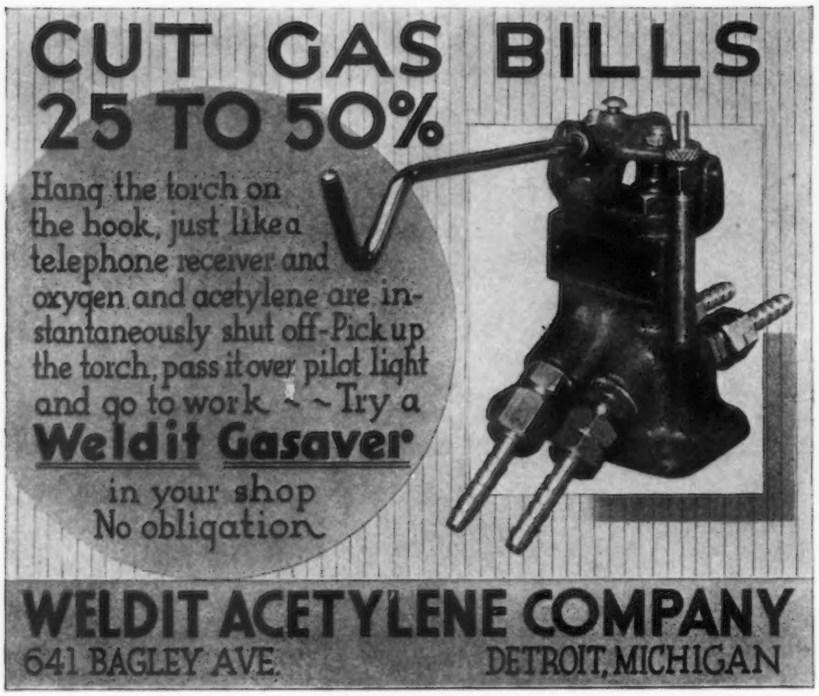
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ganized by Mathew Keck and L. J. Heidgen, to manufacture universal joints and other mechanical appliances for automobiles, motor trucks, etc.

Quartermaster Depot, 1819 West Pershing Road, Chicago, asks bids until March 2 for 2440 corrugated galvanized steel ash cans (Circular 180).

City Council, Lamoni, Iowa, will soon take bids on general contract for new municipal electric light and power plant, including Diesel engine-generator units, fuel oil tanks, cooling tower and other equipment. Cost about $100,000. Young & Stanley, Muscatine, Iowa, are consulting engineers.

Independent School District No. 59, Cannon Falls, Minn., E. H. Englehart, superintendent of schools, will soon take bids for new boiler, stoker and auxiliary equipment for power plant at high school. G. M. Orr & Co., Baker Building, Minneapolis, are consulting engineers.

SOUTH CENTRAL

Glencoe Distillery Co., Inc., 723 South Twenty-sixth Street, Louisville, plans new works on Cane Run Road, including steam power house. Cost about $100,000 with equipment.

W. C. Nabors Co., Mansfield, La., W. C. Nabors, head, plans one-story addition, 40 x 200 ft., for manufacture of trailers, parts, etc. Cost over $30,000 with equipment.

Town Council, Oakman, Ala., will call for bids in spring for deep-well pumping machinery and accessories, steel standpipe, pipe lines, etc. Fund of $32,000 has been arranged. Totten & Loving, Guin, Ala., are consulting engineers.

Village Council, Ringgold, La., asks bids until Feb. 28 for two centrifugal pumps and accessories, tank and tower, pipe lines and auxiliary equipment for municipal water system. F. P. Joseph, Glenmora, La., is consulting engineer.

WASHINGTON DIST.

United States Coast Guard Headquarters, Washington, asks bids until Feb. 18 for two automatically-operated gasoline engine-driven electric generator units and accessories.

Purchasing & Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Feb. 25 for one heavy tractor and three semi-trailers (Circular 102); until March 1, truck parts, including axles, brake equipment, hubs, wrenches, castings, steel plates, springs, gas tanks, fenders, gaskets, steering gear, etc. (Circular 103).

Crown Cork & Seal Co., Eastern Avenue and Kresson Street, Baltimore, manufacturer of bottle caps, bottle-sealing machines, parts, etc., will soon begin superstructure for two one-story units, 80 x 300 ft., and 31 x 32 ft., and four-story structure, 100 x 192 ft., for which general contract recently was let to Consolidated Engineering Co., 20 East Franklin Street. Cost over $100,000 with equipment. Three-story office and operating building will also be built.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 19 for rivets, burrs and washers (Schedule 4241); until Feb. 26, impulse blading (Schedule 4173), propeller hubs (Schedule 4291), steel bars (Schedule 4270); until March 1, flat steel springs (Schedule 4287) for Eastern and Western yards.

FOREIGN

Babcock & Wilcox, Ltd., Dunbarton, Scotland, manufacturer of watertube boilers and equipment, steel boiler tubing, etc., is planning extensions and improvements in tube works. Cost over $300,000 with equipment.

Quaker Oats Co., 141 West Jackson Boulevard, Chicago, is considering new plant at Maashaven, Holland, for production of cereals, to cost over $250,000 with equipment.

Pan-American Grace Airways, Inc., 135 East Forty-second Street, New York, is considering new hangar with repair and reconditioning shops near Lima, Peru. Cost close to $50,000 with equipment.

PACIFIC COAST

Golden West Brewing Co., Seventh and Kirkham Streets, Oakland, Cal., has acquired four-acre tract at San Gabriel, Cal., for new branch plant, with power house and machine shop. Cost over $100,000 with equipment.

Allen Cutler, 2065 Cowper Street, Palo Alto, Cal., is at head of project to build a canning plant at Mountain View, Cal., where option has been secured on 12-acre tract. Plant will consist of main unit, 300 x 500 ft., with several smaller structures and power house. Cost close to $125,000 with machinery, conveying and other handling equipment.

Bureau of Reclamation, Denver, asks bids until Feb. 25 for one 10-in. lathe, one 24-in. upright drill press and one 10-in. pedestal grinder for machine shop at Boulder Dam power plant, Boulder Canyon Project, Arizona-California-Nevada (Specification 633-D), furnishing and installing two 4000-lb. and two 5000-lb. automatic electric-operated passenger elevators with total lift of 117 ft. and 528 ft. respectively, Boulder Canyon Project (Specification 612); until Feb. 26, one 75-ton gantry crane with one 15-ton auxiliary hoist for storage yard, Grand Coulee Dam, Columbia Basin Project, Wash. (Specification 646-D).

Washington-Idaho Lime Products Co., Spokane, Wash., E. J. Simons, general manager, plans new cement mill on Clearwater River, near Orofino, Idaho, vicinity of present lime plant. Site has been acquired. Cost over $500,000 with equipment.

San Fernando Heights Orange Association, San Fernando, Cal., has let general contract to William P. Neil Co., Ltd., 4814 Loma Vista Street, Los Angeles, for new one-story packing plant, 114 x 122 ft. Cost about $45,000 with conveying, loading and other mechanical-handling equipment. W. W. Ache, 1616 Fourth Avenue, Los Angeles, is architect.

Eastman Oil Tool Co., Los Angeles, has been organized by H. John Eastman and Jesse W. Hughes, care of Houser & Houser, Security Building, Long Beach, Cal., representatives, capital $50,000, to manufacture oil-well drilling tools and kindred oil-well equipment.

TRADE NOTES

Case Hardening Service Co., 2281 Scranton Road, Cleveland, has been appointed by the Hevi Duty Electric Co., Milwaukee, as district representative for Ohio.

The Central Steel and Wire Co., operating warehouses in Chicago, Detroit and Dayton, Ohio, has been appointed a distributer of Armco stainless steel sheets, plates and strip, produced by the American Rolling Mill Co., Middletown, Ohio.

Schmutz Foundry & Machine Co., Louisville, has moved into foundry of Vogt Brothers Mfg. Co., Fourteenth and Main Streets, which it recently took over. L. Nicoulin is general manager.

Sperry Tool Co., New York, manufacturers of the Sperry gyroscope and other naval and airplane instruments, has bought the Waterbury Tool Co., Waterbury, from F. H. Clergue and other stockholders and will continue production at Waterbury, with Lane McLean in charge as vice-president and manager. The Waterbury Tool Co. manufactures variable speed power units for many purposes such as the gearing for battleship turrets and variable speed gear boxes for all kinds of machinery.

York Corrugating Co., Jersey City, N. J., will open branch warehouse at 112 Spring Street, Paterson, N. J., about Feb. 15, carrying representative stock of Armco ingot iron sheets and formed products, made by American Rolling Mill Co., Middletown, Ohio.

Warren F. Hoye, Inc., Springfield, Mass., has been made an authorized distributer for ingot iron and steel sheets and formed products made by the American Rolling Mill Co., Middletown, Ohio.